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TELEFOL PHONOLOGY

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TELEFOL PHONOLOGY

0. INTRODUCTION

At first glance the phoneme inventory and phonological structure of *Teléfól* appear to be relatively simple.[1] However the phonemic analysis of this language has proved surprisingly difficult, and cannot yet be said to be complete even after almost five years of continuous study. Two phenomena lie behind this resistance to analytical procedures.

Firstly, as in many languages with just two prosodemes at the lexical level, the two tonemes of *Teléfól* have a wide range of allophones.[2] Because of this, they were not easy to identify, especially when viewed through the traditional framework of pitch registers or pitch contours. It was only when the idea of pitch steps was conceived and applied that the tonemic system was seen with clarity and consistency. (See section **10.**)

Secondly, several kinds of distributional asymmetry or neutralization tended to reduce the author's confidence in the accuracy of his phonetic data and the analysis based upon it, thus paralyzing analytical progress. It was only as each type of neutralization was recognized and deliberately investigated that optimism and progress returned. Neutralization of length is discussed in sections **2.** and **2.3,** of /b/ and /w/ in **4.3,** of short vowels in **6.**, of tonemes in **7.7,** and of juncture in **8.4.**

The *Teléfól* language is spoken by some 4000 people living in the vicinity of Telefomin, Territory of New Guinea.[3] The people living in the *Ifítáman, Ilibtaman,* and *Nínátáman*

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valleys all call themselves *Teléfólmiín* and speak several very similar dialects. This paper employs the dialect of the *Káyalikmiín* parish (or clan) who live in the *Ifítáman* valley within two miles of the Telefomin administrative centre. In addition to the *Teléfólmiín*, the people who call themselves *Fálamiín* and who inhabit the headwaters of the Sepik River (*Ok Tíkín*) also speak a dialect of the *Teléfól* language.

The data presented in this paper were obtained during 27 months' residence at Telefomin under the auspices of the Summer Institute of Linguistics and the Australian National University, from 1959 to 1963. The two principal informants were *Miyoméngaal (Ílinokál)* and *Máákkis (Tiínokál)*, both young men of the *Káyalikmiín* parish in their early twenties who have had considerable contact with Neo-Melanesian (Pidgin English). The author is indebted to K.L. Pike for assistance in the analysis of tone, and to S.A. Wurm for a detailed criticism of an earlier draft of this paper.

1. SYLLABLE AND WORD PATTERNS

There are eight types of syllable in *Teléfól* which may be represented by the general formula: (C)V(V)(C). A word consists of from one to six or more of these syllables in sequence.

1.1 SIGNIFICANT CONSONANTAL POSITIONS

The discussion of consonants is best handled in terms of their position with respect to the syllable. The SYLLABLE-INITIAL position includes the word-initial position and the second member of word-medial consonant clusters. The SYLLABLE-FINAL position includes the word-final position and the first member of word-medial consonant clusters. The INTERVOCALIC position cannot be satisfactorily aligned with either the syllable-initial or syllable-final position, and as it has certain characteristics peculiar to itself, it has been set up as a separate significant position.

1.2 LONG AND SHORT SYLLABLE-NUCLEI

The vocalic nucleus of a syllable may consist either of one vowel phoneme or of two identical vowel phonemes. Such geminate vowels have been regarded as constituting the nucleus of a single syllable, firstly because they consist, phonetically, of a single vocoid of approximately $1\frac{1}{2}$ moras length as compared with a nucleus of a single vowel in an

analogous context, this long vocoid showing no marked features of rearticulation. Secondly, there are no comparable sequences of two diverse vowels bounded on either side by consonants. Apart from a few loan words, the only sequences of diverse vowels observed thus far involve at least three vowel phonemes, two of which are the same, and there is a morpheme boundary at the vowel change point. Some contrasting examples of long and short syllable nuclei are presented below.

/dàl/	'kidney'; 'purlin'	/dààl/	'bamboo sp.'
/fàl/	'tree sp.'	/fààl/	'door', 'barricade'
/nàm/	'yam sp. (red)'	/nààm/	'cane cuirass'
/sàŋ/	'salt cone'	/sààŋ/	'grass sp. (skirt-making)'
/bùŋ/	'splinter (in flesh)'	/bùùŋ/	'fungus sp. (edible)'
/dùm/	'fruit'	/dùùm/	'faded', 'brown'
/kùm/	'side of neck', 'eleven'	/kùùm/	'tree sp.'; 'castor oil tree'
/bìl/	'wages (food)'	/bìil/	'arrow shaft'
/dìl/	'dusky lory (parrot)'	/dìil/	'cold (weather)'
/ìb/	'dry sand', 'dust'	/ìib/	'centre'
/tìm/	'head-louse'	/tìim/	'trunk (tree)', 'antinode (bamboo)'
/yál/	'marita sp. (red screwpine)'	/máál/	'garoka sp. (nutty screwpine)'
/kúl/	'hand'	/fúúl/	'cured (food)'
/tít/	'bridge supports'	/íít/	'above'
/àbál/	'veranda'; 'tree fern sp.'	/àbaál/	'tasty', 'sweet'
/àlál/	'garden rubbish heap'	/àlaál/	'possum tail'
/sàkám/	'knife (small)'	/sàkaám/	'distant'
/kàlák/	'your cross-cousin'	/kàlaák/	'below here'
/ìlám/	'(house) top-plate'	/ìlaám/	'rat sp.'
/ùnáŋ/	'woman'	/ùyaáŋ/	'blame (undeserved)'
/àbín/	'umbilical cord'	/àbiín/	'floor', 'bed'
/tìkín/	'roast'	/tìkiín/	'hilltop'

/tìlín/	'hollow (log)'	/tìliín/	'pre-chewed baby food'
/ìkín/	'tree sp. (for axe handles)'	/ìkiím/	'tree sp.'
/ùlín/	'club'	/kùliín/	'taro sp.'
/kàlúŋ/	'possum sp.'	/kàluúŋ/	'old leaf'
/ìlùb/	'vegetable canes'	/ìluùb/	'tree sp.'
/ìlùm/	'slopes (mountain)'	/ìluùn/	'(water bottle) stopper', 'lid'
/kúlúm/	'a vine (wild yam?)'	/múluúm/	'nose'
/núkùm/	'my friend'	/dúkuùm/	'frog sp.'
/dùlúl/	'wind'	/tùluúl/	'grasshopper sp.'
/nàtnàt/	'Nouhuys' wren-warbler'	/màbmaàt/, /mùbmaàt/	'termite'
/káŋkàŋ/	'small things'	/áŋkaàl/	'wedge', 'lever'
/ùnìn/	'to eat'	/ùùnìn/	'to roar', 'to buzz'
/úbiìl/	'possum sp.'	/úúliìb/	'bird sp.'
/ûnaák/	'baby'	/úùnoók/	'cassowary sp.'
/àloób/	'spherical'	/ààloòb/	'his uncle'
/àlák/	'his cousin'	/àáláb/	'his father'
/álím/	'tree sp.'	/wáálím/	'rat sp.'
/kàtoòb/	'down here'	/kààloòb/	'your father's elder brother'
/tìsoòl/	'grasshopper sp.'	/tìitoòk/	'rat sp.'
/fìnaàm/	'vegetable sp.'	/fìikaàl/	'lips'
/sàmaàl/	'type of shell'	/sààŋaàl/	'snipe sp.'
/nákaàl/	'shoulder'	/dáámaàl/	'marita sp.'
/àálábàl/	'his uncles'	/àálábaàl/	'his paternal grandfather'
/òókénàl/	'his aunts'	/òókénaàl/	'his maternal grandfather'
/ìlìlì/	'blue-cheeked alpine lorikeet'	/màkàyiì/	'type of bow'
/dákáyák/	'truant child'	/ímíyaáb/	'frog sp.'
/úlímàl/	'family'	/kútínaàl/	'possum sp.'
/ìlàmìn/	'to plait rope'	/ìibàmìn/	'to be insufficient'

/sìnàmìn/	'to spend night'	/dììnàmìn/	'to become stuck, caught'
/dákàmìn/	'to pitck (beans)'	/dáákàmìn/	'to plant'
/dùmánú/	'fruited'	/dùùmánú/	'faded'

1.3 FREQUENCY OF CV PATTERNS

In section 1. it was suggested that a word consists of from one to six syllables of the general pattern (C)V(V)(C). However, there is one limitation: the nuclei of medial syllables do not exhibit length contrasts and have all been interpreted as single vowels (V). Thus the general word pattern is

$$(C)V(V)(C)[(C)V(C)]^{n}(C)V(V)(C).$$

Monomorphemic indigenous words have a further limitation in that there is always at least one consonant separating two successive syllable nuclei. Their word pattern is then

$$(C)V(V)(C)[CV(C)]^{n}CV(V)(C).$$

This formula can be further characterized by statistics of 376 monosyllabic, 622 disyllabic, and 158 trisyllabic monomorphemic nouns, adjectives, and verbal adjuncts. CC is not very frequent between consecutive syllables, occurring in about 15% of disyllabic words, about 16% of trisyllabic words between first and second syllable, about 11% of trisyllabic words between second and third syllables. These figures are much less than the 50-70% figure that would be expected if words could be historically pictured as random aggregates of monosyllables. In fact, in compound formation observable in the language today a principle of consonant cluster reduction operates so that about one quarter of the potential CC sequences are reduced to C.

Word-initial vowel (rather than consonant) occurs in 15% of monosyllabic words, 38% of disyllabic words, and 29% of trisyllabic words. Word-final vowel (rather than consonant) occurs in 4% of monosyllabic, 8% of disyllabic, and 6% of trisyllabic nouns, adjectives and verbal adjuncts. However, polymorphemic verbs have a very high percentage (80% say) of final vowels since many verbal suffixes have a final vowel.

Monosyllables behave like word-final syllables as far as the occurrence of VV nuclei is concerned: monosyllables have 67%, final syllables of disyllabic words have 53%, and final syllables of trisyllabic words have 61% of VV nuclei. In

contrast, the initial syllables of disyllabic words have 17% and the initial syllables of trisyllabic words have 19% of VV nuclei.

2. MEASUREMENT OF LENGTH

It was the author's experience that vowel length was particularly difficult to identify in medial syllables. Because of this the author relied heavily on the judgment of his trained informant as to whether a given medial vowel was long or short. The fact that the informant's judgment often fluctuated for medial vowels but was invariant for the vowels of initial and final syllables raised the question as to whether there is a contrast of vowel length in medial syllables. The most consistently contrastive examples (judged by informant reaction) were recorded on magnetic tape so that detailed measurements of length could be made.

2.1 METHODS OF MEASURING LENGTH

As a sound spectrograph was not readily available, two techniques were developed for measuring phonetic segments instead of the rather laborious method of tape-cutting. Both techniques involve the use of a MLR38 Tempo Regulator that has been modified by the manufacturer (Telefonbau und Normalzeit) to give optimal performance at extremes of expansion and compression.

The first technique involves expanding the recorded utterances to exactly double their length by using the MLR38 and recording this expansion on tape running at $3\frac{3}{4}$ inches per second. This tape is audited on an ordinary recorder by threading the tape in a way that by-passes the driving capstan and, with the recorder switched to "playback", by moving the tape manually with a hand on each spool. (See figure 1.) The tape is moved back and forth rapidly over a very short distance (1/8 inch, say), and the phonetic segment at that point on the tape is identified by the characteristic scanning noises produced. It is important to keep the manual oscillation uniformly fast, as a change in the average speed at which the tape passes the play-back head will give a marked change in the timbre of the scanning noises. With practice it becomes possible to distinguish various vowel qualities, nasals, fricatives, stops, and voicelessness by the timbre of their scanning noises. Once this ability has been developed, it is then possible to locate and mark at a suitable place on the tape the transition

between successive phonetic segments of an utterance. When all such transitions within a given utterance have been marked, the length of each phonetic segment may be directly measured on the marked tape by using a scale with divisions of 0.075 inch, equivalent to 1/100 second each.

If a MLR38 is not available, it is possible to use an unexpanded tape recorded at $7\frac{1}{2}$ inches per second and to scan and measure it in the way described above. However, considerable difficulty is experienced in producing sufficiently fast manual oscillation to give adequate differentiation to the scanning noises of the various types of phonetic segments. An unexpanded tape recorded at $3\frac{3}{4}$ inches per second is better from this point of view, but suffers from the disadvantage of a scale of 0.0375 inches per centisecond, since the accuracy with which phonetic transition points can be located by manual scanning (± 4 centiseconds) is inadequate for the present purpose.

The second technique eliminates the variability involved in manual scanning. The utterances to be studied are copied onto tape at 15 inches per second. This tape is threaded onto a combination of tape recorder plus MLR38 as used for expanding or compressing, with the following deviations from normal procedure:

(a) The tape is threaded round the non-normal side of the revolving head of the MLR38. This is done to reduce the length of tape in contact with the revolving head from 0.6 to 0.1 inches (that is, the head scans less than 1/100 second rather than 4/100 second).

(b) As a consequence of (a), the tape is not given the twist (or lack of twist, depending on the type of recorder) that it usually has when it is threaded round the normal side of the revolving head.

(c) Also as a consequence of (a), it has been found necessary to raise the shield of the revolving head with a small amount of packing to avoid the upper edge of the slits in the shield wrinkling the tape.

(d) The tape is threaded between the driving capstan and friction wheel in the normal way, but the friction wheel is NOT switched into contact with the capstan. In this way, the tape is free to be advanced manually.

(e) The MLR38 is set to the maximum compression (185) and at this setting it scans a stationary tape at about 13 inches per second, which is sufficiently close to the speed at which the tape was recorded.

The emptying spool is held by hand so that when the recorder is switched on only the slack tape is taken up rather than a high-speed forward motion developing. (See figure 2.) The rotating head scans that portion of the stationary tape in contact with it, and the scanning noise produced is characteristic of the particular phonetic segment at that point on the tape. By allowing the tape to unwind very slowly it is possible to locate the transition between successive phonetic segments by the change in timbre of the scanning noise. For each transition a mark is made with a ballpoint pen on the shiny surface of the tape where it emerges from the shield of the rotating head. When all the transitions within an utterance have been marked, segmental lengths may be measured in centiseconds using a scale with divisions of 0.15 inches. Once the tape has been prepared, the process of locating, marking, and measuring phonetic transition points takes an average of only one or two minutes per segment.

2.2 CONTRASTIVE VOWEL LENGTH

Pairs of words with length contrasts in their initial or final syllable were measured, and the results indicate that long vowels (VV) are usually about 50% longer than the corresponding short vowels (V).

In a monosyllable or second syllable of a disyllabic word, when followed by voiced consonants /m/, /n/, /ŋ/, or /l/, a single vowel is about 1 mora long and a geminate vowel about $1\frac{1}{2}$ moras long. When followed by voiceless stops /b/, /k/ or /t/, or when there is no final consonant, a single vowel is about 2 moras long and a geminate vowel about 3 moras. The length of these syllables is almost unaffected by the length of their vowel nuclei as a result of compensatory adjustments to consonant length. Final voiced consonants following a single vowel are about 2 moras long and following a geminate vowel about $1\frac{1}{2}$ moras long, both VC and VVC totalling 3 moras. Thus we may talk of short and long vowels or syllable nuclei, but it is misleading to talk of short and long syllables.

In the final syllable of longer words a geminate vowel is about the same length as in monosyllables ($1\frac{1}{2}$ or 3 moras). However a single vowel is somewhat shorter than in monosyllables, being about $\frac{1}{2}$ mora long when followed by a voiced consonant and about $1\frac{1}{2}$ moras long when followed by a voiceless consonant or no consonant.

In initial syllables of polysyllabic words, when preceded by voiced consonants /b/, /d/, /m/, /n/, /w/ or /y/ or when

there is no initial consonant, a single vowel is about ½ mora long, and when preceded by a voiceless consonant /f/, /k/, /s/ or /t/ a single vowel is about ¼ mora long. A geminate vowel in the initial syllable of polysyllabic words is about 1½ moras long. Initial voiced consonants are about 1 mora long and fricatives /f/ and /s/ about 1½ moras long.

All of these statements concerning the relative length of various phonetic segments describe the approximate norms. They fail to show the considerable amount of variation in the relative length of individual segments, especially in initial and final positions. The mora is here defined as the average length of a single vowel when it occurs preceded and followed by voiced consonants in a monosyllable, in the second syllable of a disyllabic word, or in a medial syllable of a longer word. The length of the mora varies with the speed of utterance, but it is assumed that the mora and speed remain effectively constant throughout the span of a single word. In the slow speech of the illustrations below the length of the mora ranges between 8 and 13 centiseconds.

The following examples illustrate contrastive vowel length in initial and final syllables. Three or four separate utterances of each word were measured, and the lengths of phonetic segments are given in centiseconds. These repetitions of each word illustrate well the variability in length mentioned above.

All except the last four words were measured by the first technique; the last four words and all those in **2.3** were measured by the second technique. Both techniques are adequately sensitive to demonstrate contrast of vowel length. However, the measurement of intervocalic [ɾ̥] = /l/ was only practicable by the second technique, since this segment is often below the threshold of the first technique (and is consistently represented by 0 in the measurements below).

/d	à	l/	'kidney'
13	15	18	
13	13	14	
11	11	25	

/d	àà	l/	'bamboo sp.'
14	22	13	
12	24	13	
12	31	7	

/b	ù	ŋ/	'splinter'
13	11	34	
14	9	26	
12	10	21	

/b	ùù	ŋ/	'fungus sp.'
13	19	19	
9	20	25	
5	19	18	

/l̀ b/ 'dust'

19 ?
17 22
18 7

/l̀l̀ b/ 'centre'

31 4
28 5
32 ?
27 13

/à l á l/ 'garden rubbish heap'

10 0 17 13
11 0 13 21
9 0 14 20

/à l aá l/ 'possum tail'

11 0 21 18
11 0 18 11
10 0 21 11

/à b ɪ́ n/ 'umbilical cord'

7 5 10 25
9 5 10 24
4 5 12 26

/à b íɪ́ n/ 'floor'

5 6 13 26
7 4 19 25
7 5 15 23

/k à l ú ŋ/ 'possum sp.'

12 5 0 12 28
5 7 0 10 29
7 6 0 9 31

/k à l uú ŋ/ 'old leaf'

3 5 0 19 28
13 2 0 20 21
9 2 0 17 22

/l̀ l ù b/ 'vegetable canes'

9 0 22 51
9 0 21 30
10 0 22 13
10 0 20 26

/ì l uù b/ 'tree sp.'

8 0 26 3
6 0 30 52
8 0 26 6

/ù n l̀ n/ 'eat'

4 4 17 22
6 6 5 26
10 5 12 17

/ùù n l̀ n/ 'roar'

14 10 10 20
13 7 8 23
14 6 8 19

/s à m aà l/ 'shell sp.'

13 5 5 9 27
11 5 6 10 20
20 3 7 15 25

/s àà ŋ aà l/ 'bird sp.'

13 13 5 13 27
10 12 10 15 15
16 15 6 17 11

/d á k à m l̀ n/ 'pick'

11 6 3 16 9 5 15
8 2 2 18 9 6 5
9 5 4 13 9 5 12

/d áá k à m l̀ n/ 'plant'

12 7 2 21 11 4 15
12 12 3 14 8 6 11
12 14 3 12 11 3 15

/d	ù	m	á	n	ú/ 'fruited'	/d	ùù	m	á	n	ú/ 'faded'
4	8	13	11	6	19	14	9	10	11	5	17
13	6	12	9	6	18	10	8	8	10	6	17
10	4	11	13	5	17	8	9	8	12	5	17

2.3 NEUTRALIZATION OF LENGTH

In medial syllables there is no contrast of vowel length. All medial vowels have been interpreted as single vowels. These medial single vowels are about one mora long. Some pairs of words that had been believed to contrast in medial vowel length are given below. Intervocalic consonants have been measured as follows: /l/ $\frac{1}{4}$ mora; /b/ and /k/ $\frac{1}{2}$ mora; /m/, /n/, /t/, /y/ $\frac{1}{2}$ mora after single vowel of first syllable, and 1 mora elsewhere.

"Short" *"Long"*

/b á k á l á/ 'he followed'	/d á k á l á/ 'he asked'
11 4 4 11 2 15	11 5 2 14 5 14
12 4 2 14 1 19	10 6 3 12 2 18
6 4 2 11 2 18	5 8 4 9 2 15
3 4 5 8 2 16	

/ì l í k á l á/ 'he painted'	/ì l í b á l á/ 'he examined'
7 2 8 7 10 2 17	7 4 8 4 14 2 19
7 1 10 4 11 3 15	9 2 10 6 11 3 17
9 2 10 4 8 3 16	7 2 10 4 12 1 17

/ì l í k m ì n/ 'to paint'	/ì l í b m ì n/ 'to examine'
8 3 9 15 4 5 21	7 3 12 15 6 6 19
7 3 6 16 7 5 20	6 4 9 17 4 8 12
4 2 10 14 7 5 17	5 2 12 16 3 4 16

/d ù l ú l á/ 'he took them'	/t ù b ú l á/ 'it adhered'
16 5 2 12 2 20	2 6 4 12 4 17
7 5 1 12 2 21	3 5 3 15 1 24
2 4 1 10 1 23	2 8 3 10 0 21

/k à n ù m ì n/ 'to do'	/d ù t ù m ì n/ 'to release them'
6 2 2 6 11 6 14	6 9 8 9 8 4 14
3 3 2 7 11 5 16	10 8 10 7 5 7 13
4 4 1 5 9 6 17	7 8 7 5 12 3 18
7 4 2 7 8 5 17	

/f	ɾ́	k	ɾ́	l	i̱l	l/ 'bean sp.'	/b	ɾ́	l	ɾ́	l	i̱l	ŋ/ 'bird sp.'
13	6	4	6	1	10	16	12	5	2	8	3	15	16
7	4	5	6	2	11	13	7	6	1	9	2	14	10
9	2	4	6	2	13	10	3	3	2	8	2	15	12

3. CONSONANTS

In this analysis 13 *Teléfól* consonants are described: /b/, /d/, /f/, /k/, /k^{w}/, /l/, /m/, /n/, /ŋ/, /s/, /t/, /w/ and /y/. In addition, the consonants /h/ and /ʔ/ occur only in a few particles such as the exclamatory imperative enclitic /íhíʔ/ or /éhéʔ/, and /g/ and /p/ occur only in a few loan words.

3.1 THE DISTRIBUTION AND TYPICAL ALLOPHONES OF CONSONANTS are shown in the following tabulation:

Phoneme	/b/	/d/	/f/	/k/	/k^{w}/	/l/	/m/	/n/	/ŋ/	/s/	/t/	/w/	/y/
Syllable-initial allophone	b	d̪	p̪/f	k^{h}	kw	–	m	n̪	–	s̪	t^{h}̪	w	y
Inter-vocalic allophone	b̪/b	d̪	p̪/f	g̪	–	ɾ̆	m	n̪	ŋ	s̪	t^{h}̪	–	y
Syllable-final allophone	p^{h}	–	–	k^{h}	–	l	m	n̪	ŋ	–	t^{h}̪	–	–

The diacritic under [d̪], [n̪], [s̪], and [t^{h}̪] indicates that they are dentals. Bilabial [b̪] and velar [g̪] are voiced fricatives and bilabial [p̪] is a voiceless fricative. Alveolar [ɾ̆] is flapped.

The following word-medial consonant clusters have been observed, those in parentheses being observed only in polymorphemic words, and hyphen indicating sequences which would not be expected because of sandhi rules.

bb	bd	–	bk	bm	bn	bs	bt
kb	(kd)		kk	km	kn	ks	–
lb	ld	lf	lk	lm	ln	ls	lt
mb	md			–	mn	ms	mt
(nb)	nd		nk	(nm)	–	ns	nt
(ŋb)	ŋd	(ŋf)	ŋk	ŋm		ŋs	–
tb	–		tk	tm	tn	–	–

3.2 SOME FURTHER ALLOPHONES

Voiceless stops tend to be only lightly aspirated, and are unaspirated when followed by consonants. /l/ tends to be retroflexed [ḷ] in word-final position following /a/, and fricative [l̝] preceding /t/. Velar consonants tend towards a uvular articulation when contiguous with central and back vowels. Nasals tend to have a slight homorganic voiced stop at their onset when they follow long vowels, e.g. /sùùm/ [s͡u:ᵇm] 'banana'. /k/ is labialized following /uŋ/, but has less [w] off-glide than /kʷ/. Word-initial /b/ and /d/ sometimes vary to slightly ingressive [b] and [d]. Word-initial /f/ sometimes varies to the affricate [p͡ɸ]. The cluster /ld/ sounds more like [l̆] than [l͡d]. /kd/ is the single phonetic segment [g]. /bb/ is [p͡b]. /kk/ is [kˑʰ]. /ŋd/ is [ŋg].

3.3 FREQUENCY OF CONSONANTS

An examination of the same word sample as described in **1.3** reveals the following list-frequencies of individual consonants, expressed as percentages:

Consonant	/b/	/d/	/f/	/k/	/kʷ/	/l/	/m/	/n/	/ŋ/	/s/	/t/	/w/	/y/	Total
Word-initial	11	17	9	13	1	–	11	6	–	9	17	2	4	100
Inter-vocalic	9	0.3	5	17	–	29	10	9	3	4	8	–	6	100
Word-final	12	–	–	15	–	19	17	14	14	–	9	–	–	100

Somewhat different figures may be expected for verbs in the intervocalic and word-final positions because of the specific suffixes involved. Thus, intervocalic /b/, /l/, /m/, /n/ and /t/ and final /b/, /m/ and /n/ probably would be rather more frequent in verbs than the figures in the above tabulation indicate for nouns, adjectives, and verbal adjuncts.

4. PROBLEMS IN CONSONANT ANALYSIS

4.1 NEAR-COMPLEMENTATION OF /d/ AND /l/

If the very few occurrences of intervocalic [d̂] could be ignored (and /fòóde*e*́k/ 'praying mantis' is the only monomorphemic example observed), then it would be possible to analyze [ɾ̌], [l] and [d̂] single phoneme. It appears that this was in fact the historical situation. (A condition favouring the historical development of initial [d̂] and intervocalic/final [ɾ̌] ~ [l] into separate phonemes is the lack of opportunity for allomorphic alternation between initial and intervocalic sounds due to the absence of active prefixation in *Teléfól.*)

However, in the present analysis two phonemes /l/ ([ɾ̌] ~ [l]) and /d/ were set up even though they contrast only in the intervocalic position. This takes account of the few cases of intervocalic [d̂] and of the additions to their number being made by loan words: /dídímàn/ 'agronomist', /mòòdeèn/ 'mountain', /éédeèn/ 'heathen', /falaedee/^{T} 'Friday', /saladee/^{T} 'Saturday'. (Superscript (^{T}) indicates items for which no tonal information is available.)

4.2 MEDIAL [g]

On the basis of morphological analysis, the few occurrences of medial [g] have been interpreted as allophones of /d/ as follows: intervocalic [g] = /kd/ and [ŋg] = /ŋd/. The only examples of /kd/ are at a morpheme boundary (e.g. /òòk dììm/ [ɔ$^{\perp}$ of /ŋd/ are monomorphemic (e.g. /níŋdíl/ 'few'). When [g] occurs at a morpheme boundary the separate morphemes exhibit

[k] and [d] or [ŋ] and [d] in other contexts. Loans have brought in almost no examples of medial [g], but a few of word-initial [g]: [g͡ot] /gɔ̀ɔ̀t/ 'God', /gíìtà/, /kíìtà/ 'guitar'. For the present, this may be analyzed as an extra-systematic phoneme /g/. Should initial /g/ become well established through many loan words, the medial occurrence of [g] could be re-interpreted as /g/ rather than /d/, that is, [g] = /g/ or /kg/, [ŋg] = /ŋg/. This would increase morphophonemic complexity somewhat, but in conformity with an existing pattern: after velars /t/ > /k/ and /d/ > /g/.

In 1957 Rev. G.J. McArthur of the Australian Baptist Missionary Society made a tentative phonemic analysis of *Teléfól* in which the intervocalic contrast of [ʒ] and [k·ʰ] was regarded as a contrast of /g/ and /k/. Medial [g] was analyzed as /g/ and initial and final [kʰ] as /k/. However, this analysis results in very extensive morphemic alternation at the morphophonemic level, since word-final [kʰ] regularly becomes intervocalic [ʒ] upon suffixation. The present analysis keeps this morphemic alternation at the allophonic level by regarding intervocalic [ʒ] as an allophone of /k/;
maintained by regarding the latter as /kk/.
of intervocalic [k·ʰ] is also supported by a morphemic analysis of some of its occurrences, e.g. /súùkkoón/ 'paper' from /súùk/ 'tobacco' and /kòón/ 'leaf', 'wrapper'.

Should syllable-initial /g/ become well established through loan words, there would seem to be no advantage in attempting to link intervocalic [ʒ] with it as an allophone.

4.3 NEUTRALIZATION OF /b/

In intervocalic position /b/ and /w/ do not contrast. Following /i/, /e/, and /a/ only [ɓ] occurs, and following /o/ and /u/ lenis [ɓ] and [w] occur in free variation. All intervocalic occurrences of both [ɓ] and [w] are here regarded as allophones of /b/. Firstly, this results in a simple distribution of consonants, with /w/ only in initial position, and /b/ in initial, final, and all intervocalic positions, irrespective of the preceding vowel. Secondly, this avoids morphophonemic variants when a noun stem with final /ob/ or /ub/ is suffixed (e.g. /sòɔ̀b/, /sɔ̀ɔ́bím/

'possum') or when a verb stem ending in /o/ or /u/ is suffixed for the near past or present continuous tenses (e.g. /bókoɔ̀/ 'say', /bókɔ̀bá/ 'he said').

If intervocalic [ɓ] after /i/, /e/ and /a/ is regarded as /b/, and freely varying [ɓ]/[w] after /o/ and /u/ are both interpreted as /w/ as was done by McArthur (and this practice is followed by many literates in their writing), then a consonant distribution results which is unparalleled by other consonants: /w/ in initial position and intervocalic position after /u/ or /o/, and /b/ in initial and final positions and intervocalic position after /i/, /e/ or /a/. Also allomorphic alternation between /b/ and /w/ is introduced, e.g. /sɔ̀ɔ̀b/, */sɔ̀ɔ́wím/ 'possum'; /báká/ 'follow', /bákábá/ 'he followed', /bókoɔ̀/ 'say', */bókɔ̀wá/ 'he said'.

A third analysis, with most of the advantages of the one adopted here, would regard all occurrences of intervocalic [ɓ] as /b/ and all occurrences of [w] as /w/. Thus /b/ would occur in all intervocalic positions, but /w/ would only occur in free variation with /b/ following /o/ and /u/.

Following /u/ the situation is somewhat more complicated. Although /k/ and /b/ contrast in this environment as elsewhere (e.g. /úbál/ 'bird sp.', /úkál/ 'she herself'), the phonetic difference is often quite difficult to hear since the /k/ tends to be a lip-rounded fricative [g̬] in this context. In addition, some words containing the sequence /uba/ in the speech of my second informant contain /uka/ in the speech of my first informant, e.g. /sùbàyoɔ̀k/, /sùkàyoɔ̀k/ 'long ago', and this leads to confusion unless only one informant is used.

4.4 INTERVOCALIC /y/

The occurrence of /y/ and /w/ in intervocalic positions is uncertain. As mentioned above in **4.3**, intervocalic /w/ does not follow /a/, /e/ or /i/ and it has been assumed on grounds of simplicity that it does not follow /o/ or /u/ either. On the other hand, /b/ clearly does occur following /a/, /e/ and /i/ and it has been assumed that it also follows /o/ and /u/. When one comes to interpret a sequence such as [uːa], */uwa/ has been ruled out and /uba/ has been suggested as the acceptable interpretation. But a third possibility, */uua/ or */ua/, needs to be considered also. However, there are no non-suspect sequences of unlike vowels in *Teléfól* except at morpheme boundaries. Thus, in the absence of a morpheme boundary, there is no satisfactory analogy for an interpretation such as */uua/ or */ua/.

Turning now to /y/, it may be noted that there are clear intervocalic occurrences such as /ùyaáŋ/ 'undeserved blame', /káyaàm/ 'dog'. When it comes to the interpretation of sequences such as [i·a], in the absence of a morpheme boundary /iya/ is the only reasonable interpretation because of the lack of non-suspect monomorphemic unlike vowel sequences as a basis for positing */iia/ or */ia/.

4.5 LOANS WITH /p/

A few loan words from Neo-Melanesian contain initial and intervocalic lightly aspirated /p/ and this is often an idiolectal variant with /b/: /fàpuà/ 'Papua(n)', /kààpà/, /kààbà/ 'corrugated or sheet iron', /pîkìm/, /bîkìm/ 'a pick'. Intervocalic /p/ seems to be in contrast with intervocalic /bb/ [pb], as in /bàábbaà/ 'insect bite'. Several more occurrences of /p/ without variation to /b/ would be needed to regard /p/ as established in *Teléfól*.

4.6 LOANS WITH FINAL /s

Teléfól indigenous words do not have final /s/. However, many *Teléfól* speakers are familiar with neighbouring cognate languages that do have final /s/.
with final /t/ have allomorphs with /s/ instead when followed by a vowel in derived forms, e.g. /úleèt/, /úleèsím/ 'possum sp.'. Consequently, loan words with final /s/ have been readily accepted into *Teléfól* and before long it will probably be possible to say that final /s/ has been established in contrast with final /t/, though some free variation occurs at present. /kálaàs/ 'mirror', /wáàs/, /wáàt/ 'pastor', /díliìs/, /díliìt/ 'beef dripping', /bóólìs/ 'policeman', /kálábuùs/,/kálábuùt/ 'gaol', /óóbìs/ 'office', /ílaès/, /ílaèt/ 'rice', /kàábiìs/ 'spinach', /másiìs/ 'matches', /fíìs/ 'tinned fish', /tóòt/, /tóòs/ 'torch, flashlight', /kúùs/, /kùs/ 'cough, cold', /búùs/ 'forest', /yèèsùs/ 'Jesus'.

4.7 COMPLEMENTATION OF /k^w/ AND /ŋ/

Although [kw] and [ŋ] are in complementary distribution (see **3.1**), they have been analyzed as two separate phonemes /k^w/ and /ŋ/ rather than as allophones of a single phoneme because (a) these two items do not occur in allomorphic alternation, and (b) there is no precedent in neighbouring cognate languages for treating [kw] and [ŋ] as allophones.

5. VOWELS

In this analysis 5 *Teléfól* vowels are described: /a/,

/e/, /i/, /o/ and /u/. Long vowels have been tentatively analyzed as geminates VV.

5.1 THE DISTRIBUTION OF THE VOWELS

In monosyllables: all vowels occur geminate and /a/, /i/ and /u/ occur singly; all of these single and geminate vowels occur followed by any of the syllable-final consonants and lack of consonant; these vowels also occur preceded by any of the syllable-initial consonants and lack of consonant, except that the following sequences do not occur: /k^{w}oo/, /k^{w}u/, /k^{w}uu/, /woo/, /wu/, /wuu/. This limitation also holds in syllables of longer words. In monosyllabic nouns the sequences /ki/, /kwa/, /wa/, /yi/ and /yii/ have not been observed either, but they do occur very rarely in longer words.

In poly-syllabic words there are some limitations in the interrelationship of the vowels of the various syllables, and these will receive detailed discussion below in section **6**.

Although VV nuclei are always geminate vowels in indigenous words, unlike sequences or diphthongs seem to be appearing in some loan words. Sometimes it is difficult to decide whether a particular vowel sequence is a single nucleus or whether it is disyllabic. The following list of loan words containing a diphthong in the source language demonstrates that some retain the diphthong in *Teléfól* while others replace it by a long vowel.

Teléfól	SOURCE		MEANING
/wáálìt/	NM	wailis	radio
/báàlàt/	AE	páylət	Pilate
/í	AE	iyláyjə	Elijah
/aasaya/^{T}	AE	ayzáyə	Isaiah
/éédeèn/	NM	haiden	heathen
/fáèb/	NM	paip	pipe (smoking)
/fàèl/	NM	fail	file
/náèb/	NM	naip	knife
/ílaès/	NM	rais	rice
/ìlaèn/	NM	lain	group, clan
/falaedee/^{T}	NM	fraide	Friday

Teléfól	SOURCE		MEANING
/móótú báèk/	AE	máwtəbayk	motor bike
/baebeel/^{T}	NM	baibel	Bible
/ááslìk/, /úslìk/	NM	haus sik	hospital
/ááslúkùl/, /úslúkùl/	NM	haus skul	school
/ááskuùk/	NM	haus kuk	kitchen
/tààbálàseéb/	PM	tau bada	European
/slítoòn/	NM	sindaun	sit
/mòòdeèn/	NM	maunten	mountain
/áútálàlìyà/	NM	australia	Australia
/bóólboòl kèèmìn/	NM	boil	to boil
/bóè/	NM	boi	employee

AE Australian English, NM Neo-Melanesian, PM Police Motu

The ready acceptance of /ae/ in loan words is probably due to the high frequency of occurrence of bimorphemic /aa#ee/ in *Teléfól* benefactive verbs.

5.2 TYPICAL VOWEL ALLOPHONES

In monosyllables and the final syllables of polysyllabic words the vowels have the following typical phonetic values:

/a/	/aa/	/ee/	/i/	/ii/	/oo/	/u/	/uu/
[ʌ^{T}/a]	[a·	[ɛ·]	[ɪ/i]	[i·	[ɔ·	[ʊ/u^{ɨ}]	[u^{ɨ}·

Some speakers make a slight distinction in the vocoid quality of single and geminate vowels fairly consistently, whereas other speakers make no such distinction. When contiguous with /s/ or /y/ the vowels /u/ and /uu/ tend to be centralized almost as far as [ʉ] [ʉ] and [ʉ·] respectively.

The values of the phonetic symbols used for the vowels are as follows:

	UNROUNDED	*ROUNDED*
	FRONT - - - - - CENTRAL	*CENTRAL - - - - - - BACK*
HIGH	i ɨ	ʉ u̟ ʊ
MID	ɘ ɛ ʌ	
LOW	ʌ̹ ɑ	ɔ

5.3 FREQUENCY OF VOWELS

An examination of the same body of data as in section **1.3** reveals the following list-frequencies for vowels, as percentages:

	Monosyllables	*Disyllabic Words*		*Trisyllabic Words*			*Average*
		1st syll.	*2nd syll.*	*1st syll.*	*2nd syll.*	*3rd syll.*	
/a/	13	23	21	30	36	16	22
/aa/	10	7	15	5	-	9	9
/ee/	17	2	7	3	-	9	7
/e/	-	3	-	1	7	-	1
/i/	10	26	14	25	26	17	19
/ii/	11	6	8	3	-	10	7
/oo/	18	6	15	3	-	24	12
/o/	-	5	-	3	12	-	3
/u/	9	16	12	22	19	7	13
/uu/	12	6	8	5	-	8	7
Total	100	100	100	100	100	100	100

In the polysyllabic words, for each vowel quality there is a clear trend for geminate vowels to predominate in the final syllable and single vowels to predominate in the initial syllable. This confirms the CV pattern trend mentioned in **1.3**.

6. VOWEL NEUTRALIZATION

In non-final syllables of polysyllabic words, and especially in initial syllables, there appears to be a certain amount of neutralization of the contrasts between single vowels.

6.1 WORDS WITH INITIAL VOWEL

The initial syllable of words with initial vowel, though short, is easy to hear and there is good evidence for contrast. The phonetic quality of these initial vowels is /a/ = [ʌ], /i/ = [ɪ], /u/ = [ʊ].

/álím/	'tree sp.'	/ílím/	'tinea; cloth'	/úlím/	'father-and-child'
/ánáŋ/	'place'	/ínám/	'tree sp.'	/únám/	'grass skirt'
/ákít/	'drying rack'	/íkít/	'male animal'	/úkíl/	'bird sp.'
/àfáb/	'rear of house'	/ìfák/	'perspiration'	/ùfáb/	'bird sp.'
/àbaál/	'tasty'	/ìbaál/	'barbecued'	/ùbaál/	'tree sp.'
/àmiít/	'brown pine'	/ìmiín/	'hors d'oeuvre'	/ùmiín/	'elephant beetle'
/àleém/	'bird sp.'	/ìleén/	'edge of forest'	/ùleèm/	'timid'
/áloòb/	'two'	/íloòb/	'green blowfly'	/úloòl/	'inner face of dam'
/álú/	'marita sp.'	/ílúm/	'foetal sac'	/úlúk/	'sugar cane sp.'

6.2 WORDS WITH INITIAL CONSONANT

However, in words with an initial consonant the linguist's difficulties begin. In addition to the general shortness of the vowels of initial syllables, they are extremely short or even missing altogether when followed by intervocalic /l/, and especially when the word-initial consonant is /b/, /d/,

/f/, /k/ or /t/. The first syllable vowel is almost as short, though never missing, when followed by an intervocalic /k/. (These auditory impressions of shortness have not yet been checked by measurement.) Also, the vowel of the first syllable is partially devoiced following initial /k/ and /t/. Furthermore, many short initial syllables contain a puzzling central vocoid [ə] that does not occur in final syllables.

Under these circumstances the author found vowels rather difficult to identify, so made a special investigation of 312 disyllabic monomorphemic words with the general pattern CVCV(V)(C) to determine whether or not the three-way contrast of single vowels is maintained following an initial consonant. The results indicate that following an initial consonant there is a partial neutralization of vowel distinctions, and that only two-way vowel contrasts occur.

(a) Following initial /k/ single /i/ does not occur. However, /a/ and /u/ both occur (26 and 21 occurrences respectively) and are in clear contrast. In this context /a/ has free variant allophones [ʌ˞], [ʌ] and [ə], and /u/ is [ʊ].

/káleèl/	'possum nest in limestone sink-hole'	/kúleèl/	'landslide'
/kámán/	'snake sp.'	/kúmák/	'ginger (plant)'
/kàtíb/	'small'	/kùtím/	'morning'
/kàluún/	'widow'	/kùluúk/	'frog sp.'
/kàliím/	'moon, month'	/kùliín/	'taro sp.'

(b) Following initial /b/, /d/, /f/, /m/, /n/, /s/ and /t/ and preceding intervocalic /n/, /s/, /t/ and /y/ 55 occurrences of /i/ have been observed, as well as 11 occurrences of /i/ freely varying with /a/ (and with /u/ too, in two cases), and just one occurrence of invariant /a/. This latter may be regarded as the sole instance of vowel contrast in this context. In this context /i/ is [ɪ] and /a/ is [ə]/[ʌ].

/mánúl/	'long net hat'	/bìnúŋ/	'parasitic growth on tree'

(c) Following initial /b/, /d/, /f/, /m/, /n/, /s/, /t/ and /y/ and preceding intervocalic /b/, /f/, /k/, /l/, /m/ and /ŋ/ 177 words have been observed in which the single vowel of the first syllable is identical to the vowel(s) of

the second syllable. Such a homophonous vowel, whether it be /a/, /i/, or /u/, has [ə] as a free variant allophone, and even [ʌ] has occasionally been recorded as a free variant. In addition 14 words have been observed in which there is free variation between a homophonous vowel and /u/, and 7 words in which invariant /u/ occurs. These latter may be regarded as the only instances of vowel contrast in this context. In homophonous contexts /i/ is [ɪ]/[ə], /a/ is [ʌ]/[ə], /u/ is [ʊ]/[ə]; non-homophonous /u/ is [ʊ].

/dàlán/	'tree sp.'	/dùlaán/	'frog sp.'
/yákaàl/	'adze'	/yúkaàm/	'banana sp.'
/sàkaám/	'distant'	/sùkaán/	'frog sp.'
/sàŋaáŋ/	'fern or grass sp.'	/tùŋaál/	'dancing chest straps'
/bèleél/	'biting fly'	/dùleél/	'small dancing shells'
/nèleèn/	'bird sp.'	/dùleèb/	'lizard sp.'
/tímít/	'cucumber'	/dùmít/	'small reeds with yellow flower'

An examination of 51 monomorphemic disyllabic nouns, adjectives and verbal adjuncts of the general type CVCCV(V)(C) shows approximately the same features of frequency, free variation and contrast described above for words with a single intervocalic consonant. A few contrastive examples catalogued as above are:

(a)	/kàbkeét/	'bachelor'	/kùbmì/	'frog sp.'
(b)	/nàtnàt/	'bird sp.'	/nítnaàt/	'ventilators'
(c)	/bàŋkáb/	'swelling'	/túŋkák/	'yawn'

However, two cases of contrast do not fit in with the observations for category (c) of the words with a single intervocalic consonant where /i/ does not precede a syllable containing /a/:

/sìŋsaáŋ/, /sàŋsaáŋ/	'leafless'	/sùŋdaàm/	'ash on skin'
/fìlnaàŋ/	'bird's head feathers'	/bàlbàl/	'type of insect'

An examination of polymorphemic disyllabic words of all word classes of the general type CVCV(V)(C) reveals the following situation:

(a) Following initial /k/, /u/ and /a/ occur in clear contrast. The only occurrence of /i/ is the phrase modifier

/kìmín/.

/káboó/	'you (masc.)'	/kúboó/	'you (fem.)'
/kàlíb íyoó/	'these'	/kùlíb íyoó/	'those'
/kàlaák/	'down here'	/kùlaák/	'down there'
/kàtoòb/	'down here'	/kùtoòb/	'down there'
/kàmeèt/	'up here'	/kùmeèt/	'up there'
/káfúmìn/	'to lift you'	/kúfúmìn/	'to lift her'
/kámòmìn/	'to look after you'	/kúmòmìn/	'to look after her'

(b) (c) Single vowels following initial consonants other than /k/ seem not to be limited in their occurrence, although the evidence for a three-way contrast is rather fragmentary.

		/nítá/	'I'	/nútá/	'we'
		/nìsoó/	'with me'	/nùsoó/	'with us'
/sànánú/	'seedy'	/wínànú/	'has a yolk'		
/dàmánú/	'matured'			/dùmánú/	'fruited'
/dákàmìn/	'pick beans'			/dúkàmìn/	'take her'
/tábànú/	'padded'	/tíbànú/	'brown'	/fùbánú/	'tassled'
/fálámá/	'he is fasting'	/fìlánú/	'has humus'	/dùlánú/	'scarred'

It is noteworthy that monomorphemic words with a single intervocalic consonant exhibit the highest degree of vowel neutralization, monomorphemic words with intervocalic consonant clusters exhibit slightly less vowel neutralization, and bimorphemic words with a single intervocalic consonant the least degree of neutralization. It seems likely that a historical explanation of this gradation is possible.

6.3 VOWEL ALLOPHONES

In initial syllables there is no contrast between /u/ and /o/ or between /i/ and /e/. (However /uu/, /oo/, /ii/, and /ee/ all occur and contrast in initial syllables.) Since single /e/ and /o/ do not occur in monosyllables and final syllables, it would be possible to interpret any occurrence of [ɛ] or [ɔ] in initial syllables as allophones of /i/ or /u/. However, in the present analysis, the occurrences of [ɛ] and [ɔ] have been interpreted as occurrences of /e/ and

/o/. Though the details of the non-contrastive distribution of /e/ and /i/ and of /o/ and /u/ require further field checking, it seems that /e/ and /o/ occur in initial syllables following an initial consonant when the following syllable contains /ee/ and /oo/ respectively, and that /i/ and /u/ occur in all other contexts. Neither single /i/ nor /e/ are observed following initial /k/.

In this analysis [ə] in initial syllables has been allotted to /a/ if the initial consonant is /k/. For other initial consonants [ə] in the initial syllable has been allotted to /a/ preceding intervocalic /n/, /s/, /t/ and /y/; and preceding intervocalic /b/, /f/, /k/, /l/, /m/ and /ŋ/, [ə] in the initial syllable has been allotted to whichever of the five vowel phonemes occurs in the second syllable. Alternatively, it would be possible to set up a sixth vowel phoneme */ə/. However, such a phoneme would never occur as an invariant but always in free variation with some other vowel phoneme, and would never participate in more than a three-way vowel contrast.

"Missing" vowels have invariably been interpreted as being identical to the vowel of the next syllable. First syllable vowels that are not homophonous with the second syllable may be very short before /l/ but never completely disappear. The toneme belonging to a devoiced or missing vowel may be inferred from the phonetic pitch of the following syllable. That is, the particular allophone of the toneme of the following syllable is partly determined by the toneme of the hard-to-hear syllable. In fact, this conditioning provides direct evidence of the reality of the "missing" vowel preceding intervocalic /l/. For instance, it is observed that problematic [p̲ř̲ʌ˥pʰ] 'flea' has a pitch pattern similar to both monosyllabic /fàb/ [p̲ʌ˥pʰ] 'grass sp.' and disyllabic /naka/ [nʌg̲ʌ˥] 'outsider', and that problematic [b̲ř̲u̲l̲] 'borer' has a pitch pattern similar to both monosyllabic /búl/ [b̲u̲l̲] 'point' and disyllabic /búbúl/ [b̲u̲b̲u̲l̲] 'heart'. However, problematic [d̲ř̲ʌ˥n̲] 'tree sp.' has no monosyllabic analogue, but it does have a disyllabic analogue in /dàkán/ [d̲ʌg̲ʌ˥n̲] 'thin cane sp.'. Monosyllabic nouns, adjectives, and verbal adjuncts exhibit two common contrastive pitch patterns and disyllabic ones three. Words with initial contoid sequences [bř], [d̲ř], [p̲ř], [kř] or [t̲ř] exhibit the same three common pitch patterns as disyl-

labic words, and these contoid sequences have been analyzed as syllables containing a "missing" homophonous vowel carrying a toneme, rather than as a consonant cluster.

K.L. Pike has suggested to the author that the neutralization of vowel contrasts in initial syllables is a direct historical consequence of the general word dynamics with its ultra-short initial vowels.

6.4 VOWEL HARMONY

As a consequence of the analysis adopted in **6.3**, five morphemes within verbs exhibit vowel harmony with the vowel of the following syllable - usually a subject-person suffix.[4] They are:

the verb stem /**tál**/ ~ /**túl**/ ~ /**tòl**/ ~ /**tíl**/ 'come'

the continuative aspect suffix variants /**-nkál**/ ~ /**-nkúl**/ ~ /**-n#kòl**/,

the homopersonal dependent suffix /**-nàl**/ ~ /**-nùl**/ ~ /**-nìl**/,

the heteropersonal dependent marker /**#səàl**/ ~ /**#səùl**/ ~ /**#səìl**/,

the heteropersonal dependent marker /**#kàl**/ ~ /**#kùl**/.[5]

It is the chief merit of the alternative analysis involving */ə/ that these five morphemes would have no vowel harmony allomorphs.

7. TONEMES

The analysis adopted in this paper involves two tonemes, an UP toneme marked with an acute accent, and a DOWN toneme marked with a grave accent. The behaviour of these phonemes is best illustrated by first considering words that contain only single vowels, that is, words containing no geminate vowels.

7.1 DISTRIBUTION OF TONEMES

Each short syllable-nucleus carries or contains one toneme, except for a few contracted syllables which carry two tonemes. Within each syllable there seems to be no correlation or co-occurrence limitation between the toneme and the consonants and vowels. Between the tonemes of syllables within a word there are no limitations of co-occurrence. However, if one restricts the enquiry to single morphemes some trends may be noticed. For instance, of monomorphemic

disyllabic nouns, adjectives and verbal adjuncts, 48% are DOWN-UP, 43% are UP-UP, only 8% are DOWN-DOWN, and just 1% are UP-DOWN. Of monomorphemic verb stems 77% are UP-UP, 16% are DOWN-UP, only 6% are DOWN-DOWN, and none are UP-DOWN. Nevertheless, taking words as a whole, two monosyllabic, four disyllabic and eight trisyllabic contrastive tonal patterns have been observed. Not all of the expected sixteen four-syllable patterns have been observed, partly because such long simple nouns are rare, and compounds involve tonal sandhi which reduces the number of patterns possible for them, and partly because polysyllabic verbal suffixes do not include all of the tonal possibilities. The best contrastive examples of all the one, two, and three syllable tonal patterns are listed below.

/bíl/	'wild banana sp.'	/dál/	'shallow water'
/bìl/	'payment feast'	/dàl/	'kidney'
/dúb/	'wild cane sp.'	/dám/	'white clay'
/dùb/	'tree sp.'	/dàm/	'body'
/kúl/	'hand'	/ún/	'arrow'
/kùl/	'frog sp.'	/ùŋ/	'thigh'
/búk/	'tree sp.'	/tít/	'bridge support'
/bùk/	'pig's foraging'	/tìt/	'splinters (on dry wood)'
/tín/	'native bee'	/bán/	'palm'
/tìm/	'head louse'	/bàn/	'ceremony'
/dìnìn/	'to build'	/bàlbàl/	'friendly'
/dìlím/	'mistletoe sp.'	/bànbán/	'shame'
/dúlìn/	'taken'	/káŋkàŋ/	'small things'
/dílím/	'rat's teeth marks'	/bímbín/	'frog sp.'
/kàfùŋ/	'walking stick'	/ìlì/	'snake sp.'
/àkúm/	'gourd water-bottle'	/ùlín/	'club (weapon)'
/núkùm/	'my friend'	/úlìn/	'planted'
/ákúm/	'wild banana sp.'	/úlín/	'Plant it!'
/nàkàl/	'I myself'	/ìlàŋ/	'dark-stained water'
/màkál/	'hindquarters'	/ìlám/	'house top-plate'
/mákál/	'wild cane sp.'	/ílám/	'dream'
/tìkìnìn/	'to persist'	/kànùmìn/	'to do'
/fìkìlíl/	'tree sp.'	/ìmìlím/	'tinea'

/dìmíníl/	'parrot sp.'	/nàmáyím/	'white cockatoo'
/ìlúlìn/	'vessel containing water'	/ìmákìm/	'husband'
/núkùmàl/	'my friends'	/ímdàlìm/	'his half-sibling'
/dísànú/	'it cooled'	/yámànú/	'it ripened'
/fíkínìm/	'banana sp.'	/kábúmìn/	'to roast'
/dílíbín/	'pig pox'	/kábúmín/	'Roast it!'

7.2 PHONETIC DETAILS OF TONEMES

The actual shapes of the pitch contours of words seem to be unaffected by the particular consonants and vowels they contain. However, they *are* affected by the tonal context in which the word occurs, as may be seen in Tables I, II, and III, as well as by the specific sequence of tonemes contained in the word itself. In the context formulae /./ represents a final intoneme with or without a pause.[6] The sandhi-free tonal contexts are represented as monosyllabic words, and their pitches are shown with dotted contours. The five guide lines represent high, upper-mid, mid, lower-mid, and low pitch respectively, reading from top to bottom. The phonetic accuracy of these pitch contours cannot be vouched for. They are based solely on the author's impressions. However, the contrasts between them have been thoroughly checked.

7.3 STRESS

The author has not been able to detect any consistent and marked differences in loudness between the syllables of a word. On various occasions "stress" has been noted, but later checking has shown that such observations were in fact falling pitches, high pitches, or phonetically long vowels, all of which are features associated with Australian English "stressed" syllables.

7.4 TONEMES OF LONG SYLLABLE-NUCLEI

Although words containing geminate vowels may be analyzed in terms of the same two UP and DOWN tonemes as words containing only single vowels, there are some differences of toneme distribution.

Words whose first syllable-nucleus is short but whose final syllable-nucleus is long, exhibit pitch contours identical in number and phonetic detail to those for words containing only short syllable-nuclei. It has been concluded from this that these words have the same possibilities for

the occurrence of tonemes as do words that have all their syllable-nuclei short. Thus length of the final syllable-nucleus does not affect toneme distribution, and a final long syllable-nucleus normally carries only one toneme. The toneme is arbitrarily written on the second vowel of a geminate in the final syllable.

/sàmaàl/	'shell sp.'	/dìliìŋ/	'bird sp.'
/sàkaám/	'distant'	/dìliíŋ/	'thigh (bone)'
/sákaàm/	'flying fox sp.'	/bíliìl/	'barbed arrow'
/fákaáŋ/	'cheeky'	/ímniíŋ/	'brother-in-law'
/ùkuùm/	'bird sp.'	/ìloòt/	'a blazed trail'
/dùluúm/	'board'	/ìloób/	'half-caste'
/úkuùm/	'too short'	/íloòb/	'green blowfly'
/múluúm/	'nose'	/íboó/	'you (plural)'
/tìyaàb/	'feathered bag'	/nèleèn/	'bird sp.'
/mìyaák/	'bamboo spoon'	/bèleél/	'biting fly'
/bíyaàl/	'black palm sp.'	/démeèn/	'taro sp.'
/títaáb/	'wood chips'	/mémeél/	'vein, tendon'
/dùbàlaàb/	'vine sp.'	/ìmnòeèn/	'bird sp.'
/bìnìŋoók/	'star'	/dùlèbeén/	'lizard sp.'
/dìmínoók/	'grass sp.'	/dùmákoók/	'type headdress'
/àlíkaàb/	'whole'	/dàmánoòk/	'bird sp.'
/íntàbeèn/	'what?'	/átòkuùm/	'scorpion'
/ánìbeén/	'my mother'	/túfòbeén/	'yam sp.'
/díkíyoòŋ/	'crooked'	/tísóloòk/	'grasshopper sp.'
/díŋíloóm/	'wild raspberry'	/káŋéloók/	'sword grass sp.'
/mìlìleèb/	'night'	/àtànìm/	'sun'
/àlìseéb/	'python sp.'	/tìsàlá/	'he didn't come (historic)'
/tùlúkeén/	'bird sp.'	/dèkékím/	'swallow sp.'
/bàtúkuùŋ/	'charcoal'	/fèlélìm/	'sweet potato sp.'
/dúbànbeè/	'he is burying him'	/túbdèkìm/	'taro sp.'
/kábùluúm/	'snake sp.'	/úlèsím/	'possum sp.'
/dúlámeèn/	'bird sp.'	/sálmánìm/	'owl sp.'
/kábúluúm/	'grasshopper sp.'	/fákálá/	'he planted them'

7.5 WORDS WITH FIRST SYLLABLE-NUCLEUS LONG

Words whose first syllable-nucleus is long (including monosyllables) exhibit twice as many contrastive pitch contours as words with all syllable-nuclei short.[7] It has been concluded from this that an initial long syllable-nucleus always carries two tonemes, one on each vowel of the geminate. All four toneme sequences /´´/, /`̀/, /`´/ and /´̀/ occur on geminates in initial syllables, and there seem to be no limitations in their distribution with respect either to the consonants and vowels of that syllable or to the tonemes of the other syllables.

/dòòl/	'pandanus sp.'	/òòk/	'water'
/dòól/	'tree sp.'	/òók/	'thumb'
/dóòl/	'insect sp.'	/dóòt/	'fern sp.'
/dóól/	'forked'	/móók/	'type of stone adze'
/mòòm/	'my uncle'	/dèèŋ/	'happy'
/mòóŋ/	'wasp sp.'	/dèéŋ/	'27'
/móòŋ/	'tree sp.'	/k^{w}éèŋ/	'grasshopper'
/yóóm/	'flying fox sp.'	/tééŋ/	'arm'
/fèèt/	'arrow carving'	/dèèm/	'bird arrow'
/tèét/	'container'	/dèém/	'tree sp.'
/téèt/	'flower'	/séèŋ/	'quickly'
/ééb/	'Oksapmin salt'	/déém/	'frog sp.'
/dààl/	'pig arrow'	/fùùl/	'tree sp.'
/dàál/	'tired'	/fùút/	'plant shoots'
/sáàl/	'pandanus sp.'	/fúùt/	'quickly'
/máál/	'pandanus sp.'	/fúúl/	'cured food'
/ùùl/	'storage space'	/tììm/	'trunk, antinode'
/yùúl/	'antiphonal shouting'	/tìím/	'wild taro sp.'
/úùn/	'bird'	/tíìm/	'instead'
/yúúl/	'banana sp.'	/tíí/	'bamboo sp.'
/bààlìn/	'wide'	/k^{w}àànaàl/	'pancreas'
/òòlsák/	'anger'	/mùùmeén/	'my aunt'
/dàálìn/	'placed'	/dìímaàl/	'bird sp.'
/dàálín/	'Put it!'	/bàábeén/	'my elder sister'
/dóòlìn/	'born'	/náàkaàl/	'lizard sp.'

/dóòlí/	'I gave birth'	/néèbeén/	'bird sp.'
/dáálìn/	'planted'	/dáámaàl/	'pandanus sp.'
/dáálín/	'Plant it!'	/íínuún/	'grass sp.'
/nùùkùyùŋ/	'haze'	/dóònùlù/	'she gave birth...'
/tàànàmá/	'he can sharpen'	/dóònùmú/	'she can give birth'
/dùùtúkùl/	'bald'	/áàtúmàl/	'my uncles'
/dùùmánú/	'faded'	/máànílít/	'dog tooth ornament'
/dàálàtà/	'he put...'	/dáálàtà/	'he planted...'
/wàákùmeén/	'frog sp.'	/kéémàná/	'he showed himself'
/dàánálà/	'he put...'	/dáánálà/	'he planted...'
/dùúlálá/	'he butchered'		

7.6 PITCH CONTOURS OF WORDS WITH FIRST SYLLABLE-NUCLEUS LONG

The contours shown in Table IV are those which occur in the context /. --- ./. It may be noted that each of these contours is very similar to the corresponding contour for a word that has the same sequence of tonemes but all on short syllable-nuclei. For example, the contour [‾‾‾‾‾‾] for CV̀V́CV̀CV́C is similar to the contour [‾‾‾‾‾‾] for CV̀CV́CV̀CV́C.

7.7 STATUS OF LONG VOWELS

Long vowels in *Teléfól*, though contrastive with short ones, cannot be interpreted as geminates (VV) in the classical sense, since there are no non-suspect sequences of unlike short vowels to provide a basis for such an interpretation.[8] The traditional approach would be to treat these long vowels either as single phonemes /a:/, /e:/, /i:/, /o:/, /u:/ or as the short vowel phonemes plus a length phoneme /:/.

However, initial long syllable-nuclei always contain or carry two tonemes, and such toneme pairs have phonetic characteristics similar to toneme sequences on two successive short syllable-nuclei. This situation suggests an analysis of the long vowels in initial syllables as sequences of two identical short vowel phonemes, each carrying a toneme. Such a vowel cluster could be regarded either as a long syllable-nucleus or as a sequence of two short syllable-nuclei. Because of the lack of diverse sequences of short vowels, the analysis as a long syllable-nucleus seems to be the better alternative.

Unfortunately, the analysis of a long vowel as a geminate

vowel or long syllable-nucleus runs into difficulties in final syllables, where long vowels normally carry only one toneme. One could say that the 4-way toneme contrast on long vowels is neutralized to a 2-way contrast in final syllables. However, whatever one says about this asymmetry in the distribution of tonemes, there is no longer any tonal basis for interpreting long vowels in final syllables as geminates.

This leaves us with three types of analysis, each of which has unsatisfactory features.

(a) All long vowels are regarded as geminates (VV). In initial syllables each vowel of the geminate carries a toneme, but in final syllables only one vowel of the geminate carries a toneme. This interpretation involves toneme neutralization.

(b) All long vowels are single phonemes (V:). In initial syllables long vowel phonemes always carry two tonemes, elsewhere long vowel phonemes carry one toneme as do short vowel phonemes. This interpretation involves the occurrence of two tonemes on a single vowel.

(c) Long vowels in initial syllables are regarded as geminates (VV) and in final syllables as single phonemes (V:). Each vowel phoneme carries one toneme. This interpretation is reminiscent of Firth's polysystemic approach and is the simplest description of toneme distribution. However, it involves long vowel phonemes that occur only in final syllables.

Analysis (a) has been adopted in this paper.

8. JUNCTURE

Certain tonal and consonantal allophones are characteristic of word-initial or word-final position. These word boundary or junctural allophones were first tentatively identified for monomorphemic utterances bounded by pause and final intonemes. Then further investigation showed that the phenomena so identified only occurred at morpheme boundaries, and in turn such morpheme boundaries were considered as occurrences of a juncture phoneme.[9] In most cases, such "phonological words" are also "grammatical words". However, occasionally the phonologically and grammatically determined word boundaries do not coincide.

A juncture that lies within a grammatical word (that is, a phonological word boundary that is not a grammatical word

boundary) is termed an INTERNAL JUNCTURE. Internal juncture marked by # and external juncture marked by space or punctuation are phonologically identical, representing one and the same juncture phoneme. The two ways of marking juncture are adopted as a convenient device for distinguishing certain grammatical properties based on tactics rather than phonology.

8.1 TONAL EVIDENCE

All of the pitch contours presented so far pertain to single words. Most of them occur on monomorphemic words. The contours for which no monomorphemic examples have yet been observed occur on polymorphemic words whose status as single words is not in doubt. For example, words containing noun derivational suffixes /-im/, /-een/, /-aal/, /-ook/, kinship and personal name plural suffix /-al/, noun and adjective verbalizing suffix /-an/, and verbal neutral tense endings /-a/, /-la/, /-ma/, /-u/, /-lu/, /-mu/, etc., and combinations thereof, are undoubtedly single words.

During the analysis of tonal data several pitch contours were discovered additional to those presented so far. These contours (shown in Table V) never occur on monomorphemic words, and in fact they are identical with some of the many pitch contours that occur on sequences of two words. However, these occurrences are worthy of careful attention, since they involve morpheme sequences which all along had been assumed to be single words. All of these contours have as their chief feature an unexpected step in pitch between two successive syllables, for example high to low or low to high. A morpheme boundary always occurs between the two syllables involved in the pitch step. An investigation of these occurrences has, in some cases, resulted in a decision that two words are involved, and in other cases has led to the postulating of an internal juncture. Thus, an unexpected high-low step is interpreted as the sequence UP-JUNCTURE-DOWN, and an unexpected low-high step as the sequence DOWN-JUNCTURE-UP. Junctures have not been (cannot be?) contrastively detected between like tonemes by tonal evidence. Some common occurrences of internal juncture marked by tone are listed below.

(a) The imperative utterance terminal /à/ ~ /yà/ was regarded for a long time as a suffix because it immediately follows the verb without pause. However, it was discovered that when /à/ follows a verb with final UP toneme, it has allotones that would be expected for a separate word rather than a suffix. Further grammatical enquiry indicated that

/à/ occurs after several different types of verb in an imperative sense, and after complete utterances in a quotative imperative sense. E.g. /sìì k^{w}à./ 'Good morning.', /sìì k^{w}à yà./ 'Say, "Good morning"!'. This grammatical freedom of occurrence seems sufficient to warrant treating /à/ as a separate word rather than as a suffix. E.g. /kú yà./ rather than /kú#yà./ 'Take it!'. These two-word pitch contours of the imperatives are different from single-word contours whenever the word that the /à/ follows is either a short monosyllable with /´/ or a longer word with /`´/ as the last two tonemes.

Variant with internal juncture /#/	*Approximate meaning and distribution*	*Free variant*	*Suffixial variants and distribution*
/#bàlá/	heteropersonal	/bàlá/	--
/#sàlá/	heteropersonal	/sàlá/	--
/#kàlá/	heteropersonal	--	--
/#sìì t/	'soon', punctiliar	/sìì t/	/-siì t/ continuative
/#bóm/	'soon', punctiliar	--	--
/#bòóm/	'later', punctiliar	/bòóm/	/-boòm/ continuative
/#sòóm/	'later', punctiliar	/sòóm/	/-soòm/ continuative
/#bòómá/	habitual, closed	/bòómá/	/-bòmà/ open
/#nàmá/	abilitative, closed	/nàmá/	/-nàmà/ ~ /-námà/ open
/#bàláb/	present, closed	/bàláb/	/-bàlàb/ ~ /-bálàb/open
/#sàláb/	far past, closed	/sàláb/	/-sàlàb/ ~ /-sálàb/open
/#bòóntèmá/	'tomorrow' future	/bòóntèmá/	--
/#nákbeè/	recent habitual	/nákbeè/	--
/#nák#bàláb/	recent habitual	/nák#bàláb/	--
/#kòl/	continuative for certain verb stems, preceding /o/	--	/-kàl/ ~ /-kùl/ preceding /a/, /i/ and /u/

TABLE VI. VERB ENDINGS WITH INTERNAL JUNCTURE.

(b) Verbs containing the endings listed in Table VI show pitch contours characteristic of two words rather than of single words.[4] Recent habitual verbs ending in /#nákbeè/ and /#nák#bàláb/ have contours not observed in single words, whenever these endings follow a verb stem whose last two

tonemes are /˝`/. (There are no short monosyllabic verb stems with /`/.) For all the other endings contours that are specific to two-word sequences are observed whenever these endings follow a short monosyllabic verb stem carrying /˝/ or a longer stem whose last two tonemes are /`˝/. All of these endings have been tentatively regarded as part of the same grammatical word with the verb stem rather than a separate word. E.g. /kú#nàmá/ rather than /kú nàmá/ 'he can take it'. The reasons for this grammatical decision are our next concern.

It is true that for many of these endings there is a corresponding and identical form (except that juncture is written by space instead of #) which occurs as a separate free verb. In Table VI /sòóm/, /sàlá/, and /sàláb/ are forms of the verb 'to spend the night' and all of the others are forms of the verb 'to be'. However, although this suggests that these verbal endings should be treated as separate words, there are two types of evidence pointing in the opposite direction.

Firstly, for many of these endings there are corresponding forms differing only in tone and the absence of juncture which occur as undoubted verbal suffixes. In the case of /#bàláb/ and /#sàláb/ there is the additional fact that other persons ('I', 'he', 'she') for these same tenses are clearly suffixial in form. One consequence of the toneme distribution discussed in 7.7 should be pointed out in passing. Whereas a long vowel of a monosyllabic suffix carries only one toneme, the same morpheme carries two tonemes both when it is a free word and when it is a grammatically bound phonological word. For instance, the suffix /-soòm/ carries only /`/, but both /sòóm/ and /#sòóm/ carry /`˝/. (See Table VI.) This is one of the important aspects of the tonal properties of internal juncture.

Secondly, a final /m/ of verb stems (mainly continuative stems) is lost before endings commencing with /#b/. E.g. /fúkún/ 'think', /fúkún#bòómá/ 'he always thinks'; but /ífúm/ 'serve food', /ífú#bòómá/ 'he always serves food'. This reduction is not a general type of sandhi but is unique to verbal endings (including suffixes). Furthermore, in many cases the resulting m-less variant of the verb stem is unique to these forms of the verb. E.g. */ifú/ 'serve food' does not occur as a free word in any other context. There is no precedent for its occurrence in isolation or in periphrastic verbs.

Note that forms with final /-á/ in Table VI have this to mark the subject as 'he', and tonally identical forms with

final /-í/ 'I', /-áb/ 'you', /-ú/ 'she', /-úb/ 'we', and /-íb/ 'you/they' instead also occur. Forms terminating in /-àláb/ 'you' have analogous forms terminating in /-ùlúb/ 'we' and /-ìlíb/ 'you/they' also.

(c) The morphemes /sɔ̀ɔ́/ 'and', 'with', and /mín/ 'and', 'or' were originally thought of as being suffixed to the preceding word. But after considering the pitch contours involved and the wide range of word classes which they follow, it was decided that they are both phonologically and grammatically free. Thus, /tànúm sɔ̀ɔ́/ rather than /tànúm#sɔ̀ɔ́/ or /tànúmsɔɔ́/ 'with a man'. It should be pointed out that the first of these does have a suffixial allomorph occurring with pronoun stems (e.g. /nìsɔɔ́/ 'with me') and in several derived words (mostly adjectives): /àfálìkénsɔɔ́/ 'fairly large'; /kùmúnsɔɔ́/ 'pregnant'; /kàfánsɔɔ́/'living'; /mèébsɔɔ́/ 'near'; /mààksɔɔ́/ 'more'.

(d) Several morphemes that frequently occur as the final element in place names exhibit pitch contours characteristic of free words rather than suffixes. Because of the large and open class of place name "stems" preceding them, it has been tentatively decided to treat these final elements as separate grammatical words rather than to invoke an internal juncture: /tìbín/ 'headwaters'; /bìíl/ 'mid valley'; /kɔ̀ɔ́t/ 'slopes'; /yákán/ 'crossing', 'ford'; /tìkiín/ 'mountain', 'hill'.

(e) The location indicator /kàl/ ~ /kál/ 'at' is phonologically a separate word. It has a measure of grammatical versatility also, and is considered a grammatically free word. It should be mentioned that with two of the numerals /-kàl/ behaves as a suffix: /búkúbkàl/ 'six';/tùkàl/ 'nine'. With another numeral and four demonstratives (D2) there is suffixation involving a unique reduction of anticipated /kk/ to /k/:

/ɔ̀ɔ́k/	/ɔ̀ɔ́kál/	'five'
/kèék/	/kèékál/	'across here'
/k^{w}èék/	/k^{w}èékál/	'across there'
/kàlaák/	/kàlákál/	'down here'
/kùlaák/	/kùlákál/	'down there'

(f) About 20% of verbs are obligatorily marked for the object person. For some verbs the object person morphemes are prefixes and for other verbs the object person morphemes are separated from the following verb stem by an internal juncture, especially for punctiliar forms of such verbs.

The markers are /nám#/ 'me', /kám#/ 'you', /dúb#/ 'him', /kúb#/ 'her', and /ím#/ 'us', 'you', 'them'. Whenever these precede verb stems whose first toneme is /`/ pitch contours are observed that are normally characteristic of two words rather than a single word. Some examples are: /nám#kàálú/ 'she left me', /kúb#kùkuùb#éèlá/ 'he tried it out for him', /dúb#sùùn dàálíb/ 'they insulted him in song'. The reason for not regarding these object person morphemes as free words is that most of the verb roots which they precede do not occur alone as verb stems. Thus, an analysis of /nám#kàálú/ as /nám kàálú/ 'she left me' would be breaking all precedent since neither /nám/ nor /kàálú/ occur elsewhere as free words.

8.2 CONSONANTAL EVIDENCE

Most consonants do not provide clear allophonic evidence for the boundaries of phonological words. The three phonemes /b/, /k/ and /l/ which have positionally determined allophones in the list in section 3.1 tend to have their syllable-final allophones replaced by their intervocalic allophones when followed without pause by a word with initial vowel, and replaced by their pre-consonantal allophones when followed without pause by a word with initial consonant. The nett result is that the allophones of word-final consonants provide no consistent clues for identifying the word boundary.

On the other hand the syllable-initial allophones of /b/ and /k/ are maintained in word-initial position irrespective of whether pause, vowel, or consonant precede them. These then provide clues for identifying junctures when the preceding word ends in a vowel.

(a) The untranslatable phrase modifiers /kì/ and /kìmín/ always have initial [k^h] and hence have been regarded not as suffixes, but as forms preceded by juncture. Originally it was thought that these two forms only occurred following **-tá** series and **-ó** series pronouns, but careful examination has revealed that they follow a wide range of word classes. It has finally been decided to regard these two forms as free words rather than as forms involving internal juncture.

(b) Benefactive continuative verbs marked for second person beneficiary have [k^h] in the middle of what had at first been assumed to be a single word. Interpreting this as the evidence of a preceding juncture phoneme results in the morphology of the benefactive verbs having much closer parallels with that of non-benefactive verbs. The part of

the verb preceding the juncture is the continuative stem, and the part following the juncture consists of object prefix (constituting a benefactive "stem") plus normal tense and subject-person suffixes. However neither of these two parts of the benefactive continuative verb form occur elsewhere in the syntax of *Teléfól*, so they are regarded as being separated by an internal juncture rather than being two grammatically free words. For example, /bákaà#kèèmìn/ rather than /bákaà kèèmìn/ 'to tell you'.

8.3 PHONETIC LENGTH AS EVIDENCE

The following tentative generalizations may be suggested on the basis of sections **2.2** and **6.2**. In words commencing with the pattern CVCV(C)... the first vowel is phonetically one half or less of the length of the second vowel. On the other hand, in a pattern fragment ...CVCV(C)... that is medial or final in a word, the first vowel is never shorter than the second. Thus the ratio of the phonetic length of the two successive single vowels in the pattern fragment CVCV(C) is a clue as to whether this fragment is preceded by juncture or not. In Table VI the internal juncture of the forms /#bàlá/, /#sàlá/, /#kàlá/, /#nàmá/, /#bàláb/, and /#sàláb/ cannot be detected following a verb stem ending in a DOWN toneme on the basis of tonal evidence, but the presence of the internal juncture can be demonstrated by the relative shortness of the first vowel in each of these forms. For example, phonetic length is the only clue to the juncture contrast in the following pair of utterances: /fùùsàláb/ 'you did not cook it', /fùù#sàláb/ 'you cooked it'.

8.4 NEUTRALIZATION OF JUNCTURE

From the above discussion it may be seen that the circumstances under which juncture may be identified are quite limited - at pause, between the second and third tonemes of the sequences /ˋ´ˋ/ and /´ˋ´/, preceding the pattern CVCV(C)..., or preceding /b/ or /k/. It seems reasonable to assume that juncture occurs in other contexts also, and the question arises of how to detect it there.

The following procedure has been adopted in the analysis of *Teléfól*. If an utterance contains a string of morphemes AB which may be divided into two shorter strings A and B, and if A occurs in other utterance environments followed by a clear juncture, and if B occurs in other utterance environments preceded by a clear juncture, then the sequence AB in the original utterance is regarded as containing a juncture between A and B, unless there is definite phonological

evidence of compounding. Thus a suspected juncture that has no phonological evidence to support it within a particular utterance may be identified by testing the morphemes on either side of it in other environments where pause or juncture allophones could appear.

This procedure is based on the assumption that the occurrence of juncture at its boundary is a stable property of a morpheme and the potential for this occurrence of juncture is in fact an integral part of the morpheme just as much as the consonants, vowels and tones are.[10] This potential is normally actualized as a juncture if the contiguous morpheme also has a potential at the same boundary. The potential is not actualized if the contiguous morpheme does not also have a potential at the same boundary, i.e. is an affix or clitic.[5]

The postulating of juncture within an utterance which of itself contains no phonetic evidence of its presence is not consistent with the usually accepted principles of phonemic analysis. This involves the juncture phoneme in having a zero allophone in many contexts. Or put in another way, the contrast between the presence and absence of juncture is neutralized in contexts other than those listed in the first paragraph of **8.4**. The writing of juncture in such contexts constitutes a morphemic transcription rather than a phonemic one.

All of the discussion in **8.4** concerns the identification of juncture by phonological evidence, and applies equally to both internal and external juncture. The distinction between internal and external juncture is not based on phonology but on grammatical considerations. The distinction between the two in the transcription is purely a concession to simplicity of grammatical and morphophonemic description.

8.5 CONTRACTIONS

Some further pitch contours (see Table V) appear on words containing contracted syllables, and some of these contours are similar to ones for sequences containing juncture. When two syllables contract into one, the two tonemes of the original syllables are usually both retained on the single syllable that results. On contracted syllables UP-DOWN is written (ˆ) and DOWN-UP is written (ˇ). For example, /nú̀kùm/, /nûm/ 'my friend'; /ánìbeén/, /âbeén/ 'my mother'; /ùtámàmìn/, /tămàmìn/ 'see', 'know'. Another possibility is the contraction of a long initial syllable to a short one: /téè tám/, /tîtám/ 'up past'; /téè íít/, /tîiít/ 'up past'; /téè dàák/, /tîdàák/ 'down past'; /téè tòòb/, /tîtoòb/ 'down

past'. Another type of contraction involves vowel elision: */kòó ìleé/ > /kòôleé/ 'now'; */bòó ìleé/ > /bòôleé/ 'then'.

Most motion verbs ending in /ǐnèmìn/ have tone patterns that can only be explained by fusion of a form ending in /ii/ or /ee/ and having /´`/ as its final two tonemes with the verb /únèmìn/ 'to go'. For example: /àm éè únèmìn/ > /àm#íǐnèmìn/ 'to go home'; /dàákeè únèmìn/ > /dàákǐnèmìn/ 'to depart'; /téè únèmìn/ > /tíǐnèmìn/ 'to go past'; /bílìì únèmìn/ > /bílǐnèmìn/ 'to run away'; /bòkoòb#éè únèmìn/ > /bòkoòb#íǐnèmìn/ 'to tell him and go'.

In a few words some of these same patterns occur but the nature of the contraction is not clear: /ûnaák/ 'baby'; /âtaál/ 'grandfather'; /nǐnteém/ 'not be'.

8.6 CLITICS AND COMPOUNDS

Some morphemes have the grammatical versatility of words and yet are phonologically bound to the preceding morpheme. For instance, the predicate modifier /-tàb/ 'perhaps' might be considered a clitic.

8.7 CONFLICTING EVIDENCE

It seems that the tonal and consonantal evidence occasionally indicate different decisions with regard to juncture. For instance, the utterance terminal /kòò/ usually has initial [g] characteristic of a suffix, but a low pitch characteristic of a free word. (This latter may possibly be attributable to the presence of a final intoneme.) On the other hand, /kì/ (phrase modifier) always has initial [k^h] characteristic of a free word, but tends to have a falling pitch characteristic of a suffix.

9. SANDHI

The changes of phonemes that take place when morphemes occur in sequence within the same phonological word constitute INTERNAL SANDHI and those changes that occur when morphemes occur in sequence separated by a juncture constitute EXTERNAL SANDHI.

9.1 CONSONANTAL SANDHI

Both internal and external sandhi include the following frequently occurring changes (most examples are of internal sandhi):

/mm/ > /m/ /ùtám/ 'see it' + /-mànsá/ 'he yesterday' > /ùtámànsá/ 'yesterday he saw it'

/nn/ > /n/ /fúkún/ 'think' + /-nùbá/ 'he does' > /fúkúnùbá/ 'he thinks'

/tt/ > /t/ /sììt/ 'soon' + /-tà/ connective > /sììtà/ 'soon'

/ŋt/ > /ŋk/ /yáŋ/ 'go along' + /-tà/ connective > /yáŋká/ 'go along'

/kt/ > /kk/ /yák/ 'go across' + /-tà/ connective > /yákká/ 'go across'

/td/ > /d/ /àt/ 'tree' + /dùm/ 'fruit' > /àdùm/ 'fruit'

/ts/ > /s/ /àt/ 'tree' + /sàn/ 'seed' > /àsàn/ 'seed'

C/w/ > C /ìmuúk/ 'heavy' + /wèéŋ/ 'word' > /ìmuúk éèŋ/ 'deep voice'

C/y/ > C /dééb/ 'get' + /yáŋ/ 'along' > /dééb áŋ/ 'put it along'

Other changes seem to be limited to internal sandhi, and are tendencies rather than fixed "rules". The author's two informants differed in the frequency of usage of most of these types of sandhi.

/bf/ > /f/; /lf/ > /f/; /lb/ > /bb/; final /t/ > intervocalic /s/; /mb/ > /b/ in verbs only.

9.2 VOCALIC SANDHI

(a) Vowel harmony occurs as one type of internal sandhi, but is limited to the instances listed in **6.4**.

(b) When a sequence of two morphemes would be expected to result in a sequence of two vowels, quite often there is an accretion of /y/ at the transition point. This phenomenon occurs both internally and externally, but seems to be the property of certain specific morphemes rather than a general "rule".

/-àl/ ~ /-yàl/ plural suffix:

/sàmaá/ 'in-law', /sàmáyál/ 'in-laws'

/#èèmìn/ ~ /#yèèmìn/ (after /u/) benefactive:

/fùù/ 'cook', /fùù#yèèmìn/ 'cook for him'

/à/ ~ /yà/ imperative utterance terminal:

/bókoò/ 'talk', /bókoò yà/ 'Say it!'

/ákà/ ~ /yákà/ (some speakers only) interrogative utterance terminal:

/fùúláb ákà/ 'Did you cook it?' /fùúlá yákà/ 'Did he cook it?'

/ɔ́ɔ́/ ~ /yɔ́ɔ́/ quotative marker:

/fùúlíb ɔ́ɔ́ àkélá/ 'he said they cooked it',
/fùúlú yɔ́ɔ́ àkélá/ 'he said she cooked it'

/àm/ ~ /yàm/ 'house', 'country':

/úlɔ̀tù/ 'church', /úlɔ̀tù yàm/ 'church building'

(c) On the other hand, when a sequence of two morphemes would be expected to result in a sequence of two vowels, quite often one of the vowels is elided. This phenomenon occurs both internally and externally. No phonological basis has yet been discovered for predicting which of the two vowels will be elided. This appears to be a property of the individual morphemes:

/úyoó/ 'her', 'it' tends to drop its initial vowel when the preceding word (usually a verb) has a final vowel: /tálá/ 'he came', /tàlá yóó/ 'his coming'. The other pronouns /íyoó/, /útá/, /ítá/, etc. also sometimes drop their initial vowel.

/nímí/ 'my' and the other pronouns of the -mí series tend to drop their final vowel when the following word (usually the possessed noun) has an initial vowel: /ábiìb/ 'village', /ním ábiìb/ 'my village'.

The suffix /-ìleé/ 'and' has the allomorph /-leé/ following vowels: /fùùlìbìleé/ 'they cooked it and', /fùùlùleé/ 'she cooked it and'.

The exclamation /wàákuù/ 'No!' and the interrogative utterance terminal /ákà/ change their final vowels to single /o/ (with the same toneme) when followed by the quotative marker /ɔ́ɔ́/ as a clitic: /wàákɔ̀ɔ́ àkélá/ 'he didn't want to' (he said, "No!"), /tálá ákɔ̀ɔ́ àkélá/ 'he asked whether she came' ("Did she come?" he asked). Furthermore, the exclamation /ùù/ is completely elided before /ɔ́ɔ́/: /ɔ́ɔ́ àkélá/ 'he agreed' (he said, "Yes").

Many other uncatalogued occurrences of elision have been observed.

It should be mentioned that, although vowel elision is more frequent than the accretion of /y/, the occurrence of

vowel sequences without either type of sandhi is far more frequent than either of these.

(d) Another form of vocalic sandhi is the allomorphic alternation of long and short vowels that occurs as a direct consequence of the neutralization of vowel length in medial syllables as described in **2.3**. When a suffix is added to a stem whose isolation form has a long vowel in its final syllable, this syllable then becomes medial, and, in terms of the analysis adopted in **2.3**, the vowel is a single one in this medial position. E.g. /átaàn/, /átànín/ 'sun'; /bókoò/ 'say', /bókòlá/ 'he said'.

9.3 INTERNAL TONAL SANDHI

(a) Several noun suffixes show tonal dissimilation, the first toneme of the suffix being opposite to the last toneme of the stem. This is true of the derivational suffix /-eèn/ ~ /-eén/, and of the personal name suffixes /-èŋín/ ~ /-éŋín/, /-èŋaàl/ ~ /-éŋaàl/, /-èŋoók/ ~ /-éŋoók/, /-ìníb/ ~ /-íníb/, /-ìnaàl/ ~ /-ínaàl/, and /-ìnoók/ ~ /-ínoók/. For example, /tóloòb/, /tólòbeén/ 'possum sp.'; /ùmoó/, /ùmóeèn/ 'insect sp.'.

(b) Two derivational noun suffixes show a mixture of tonal assimilation and dissimilation, /-ím/ ~ /-ìm/ and /-oòk/ ~ /-oók/. The distributional trend of /-ím/ ~ /-ìm/ is as follows: if the last two tonemes of the noun stem are both UP then /-ìm/ occurs; in all other situations /-ím/ occurs. In the case of /-oòk/ ~ /-oók/, if the second last toneme of the noun stem is DOWN there is assimilation of the toneme of the suffix to be the same as the final toneme of the stem. If the second last toneme of the noun stem is UP or if the stem has only one toneme, then there is dissimilation of the toneme of the suffix to be the opposite of the final toneme of the stem.

(c) Other noun suffixes are relatively tonally invariant: derivational suffix /-aàl/, plural suffix /-àl/, personal name suffixes /-eén/, /-sìmeén/, /-oòk/, /-noòk/, /-sìmnoòk/, and /-seéb/. "Relatively" allows for a small number of non-systematic tonal variants.

(d) One verbal suffix exhibits tonal dissimilation as described in (a) above: /-ìnteém/ ~ /-ínteém/ negative reply. Three other endings appear to show the same kind of dissimilation, but actually involve regressive assimilation, and are described under (g) below.

(e) Several open verbal endings in Table VI exhibit tonal assimilation, the toneme of their first syllable being the

same as the last toneme of the stem: /-nàmà/ ~ /-námà/ 'he can', /-sàlàb/ ~ /-sálàb/ 'you did', /-bàlàb/ ~ /-bálàb/ 'you are doing', and /-nàlà/ ~ /-nálà/ 'he ..' (homopersonal).[4] In addition to these, the continuative benefactive endings (which are separate phonological words as is shown in 8.2(b)) all show a similar type of assimilation. For example, /fùù#yèèmìn/ 'to cook for him', /kú#yéèmìn/ 'to get it for him'. Verbal connective suffix /-tà/ ~ /-tá/ also shows assimilation.

(f) The majority of verbal suffixes are tonally invariant with respect to any influence the tonemes of the preceding stem or suffix might have on them. Among these are all of the monosyllabic subject-person suffixes, the negative suffix /-àl/, the customary suffix /-ìn/, the open yesterday past suffix /-màns/, the future suffix /-àntèm/ ~ /-àntém/ ~ /-óntèm/, the unfulfilled obligation suffix /-ànàkìn/ ~ /-ónákìn/, one variant of the abilitative suffix /-oóm/, and the connective suffix /-ìleé/ ~ /-leé/. All of the endings set off by juncture listed in Table VI are also tonally invariant.

(g) One trend that is apparent with several suffixes is that a monosyllabic suffix carrying an UP toneme, when added to a stem whose two final tonemes are both DOWN, gives rise to regressive assimilation in that the final toneme of the stem changes to an UP toneme. For instance: /fùfaàl/, /fùfálím/ 'bird sp.'. This is a regular characteristic of subject-person suffixes when they are carrying an UP toneme in a closed verb form, and they follow the stem or any suffix other than /-àl/ negative. For example: /bòò/ 'slash', /bòólá/ 'he slashed it'; */bòòlàntèm/ 'will slash', /bòòlàntémá/ 'he will slash' (compare /bòòlàntèmàlá/ 'he will not slash').

In closed verbs the tense suffixes /-màns/ ~ /-máns/ 'yesterday', /-nùb/ ~ /-núb/ 'always', and /-bìl/ ~ /-bíl/ 'often' appear to exhibit tonal dissimilation with the final syllable of the stem to which they are attached. E.g. /bòò/ 'slash', /bòòmánsá/ 'he slashed yesterday'; /kú/ 'get it', /kúmànsá/ 'he got it yesterday'. However, a consideration of the forms containing the sandhi-free negative suffix /-àl/ (e.g. /bòòmànsàlá/ 'he did not slash yesterday', /kúmànsàlá/ 'he did not get it yesterday') indicates that these three tense suffixes may be regarded as having a basic allomorph with DOWN toneme and an allomorph with UP toneme by regressive assimilation with the UP toneme of the following subject-person suffix. As indicated in the preceding paragraph this regressive assimilation only takes place when

the two syllables preceding the subject-person suffix (that is, the last syllable of the stem and the tense suffix) both have basic DOWN tonemes. Thus:

*/kúmàns/ + /-á/ > /kúmànsá/ 'he got it yesterday'
*/bòòmàns/ + /-á/ > /bòòmánsá/ 'he slashed yesterday'

(h) A few stems ending with two UP tonemes change their final toneme to DOWN when a suffix with UP is added to them. For example, /àfálík/, /àfálìkeén/ 'big'; /kútáb/ 'ashes', /kútàboók/ 'talcum powder'.

9.4 EXTERNAL TONAL SANDHI

In continuous speech the tonemes that are carried by a word in isolation are often changed under the influence of the preceding word. The modified toneme sequence carried by a word in continuous speech (that is, its sandhi form) is quite independent of its tonal form when uttered in isolation, and is determined solely by the last two tonemes of the preceding word.

(a) Words of one toneme (short monosyllables) have sandhi forms that are phonologically bound to the preceding word as compounds. These words have two sandhi forms in addition to their isolation form. After a word of a single UP toneme or a word ending in DOWN-UP the sandhi form is UP; after all other types of words the sandhi form is DOWN. For instance, the fruits (/dùm/) of various types of trees illustrate this rule:

/yál/, /yáldúm/; /àmiít/, /àmídúm/; /fàl/, /fàldùm/;
/yàà/, /yààdùm/; /ákúm/, /ákúmdùm/; /bíyaàl/, /bíyàldùm/.

Other monosyllables showing this sandhi are /sàn/ 'seed', /àt/ 'tree' and /àm/ 'region'

(b) Words of two or more tonemes (monosyllables with long nuclei and polysyllabics) have sandhi forms that are separate phonological words. This conclusion is based on the consonantal and length evidence; the tonal evidence is inconclusive. These words also have two sandhi forms which are assimilative in nature, in addition to their isolation form. When the final toneme of the preceding word is DOWN the sandhi form consists of DOWN on all syllables; when the final toneme of the preceding word is UP the sandhi form consists of the first toneme UP and all subsequent tonemes DOWN. This may be illustrated by the barks (/kààl/) of various trees:

/yál/, /yál káàl/; /àmiít/, /àmiít káàl/; /fàl/, /fàl kààl/;
/yàà/, /yàà kààl/; /ákúm/, /ákúm káàl/; /bíyaàl/, /bíyaàl kààl/.

It may be further illustrated by various nouns followed by the adjective /kàtíb/ 'small' (isolation form):

/mùùn/	'old garden',	/mùùn kàtìb/	'small old garden';
/k^{w}éèŋ/	'grasshopper',	/k^{w}éèŋ kàtìb/	'small grasshopper';
/tànúm/	'man'	/tànúm kátìb/	'small man';
/ímán/	'taro',	/ímán kátìb/	'small taro'.

It is important to note that the presence or absence of external tonal sandhi is sometimes contrastive and contrastive transcription is essential. In the following examples the non-sandhi form is given first:

/nímí sàŋ/	'my story-telling' (/nímí/ 'my')	/nímísàŋ/	'(tell) about me'
/nímí àkeèt/	'my thoughts'	/nímí ákeèt/	'(think) about me'
/kóól tèém/	'hole for a ground-oven'	/kóól téèm/	'in a ground-oven' (/kóól/ 'ground-oven')
/àt dìím/	'up a tree' (/àt/ 'tree')	/àt dììm/	'on a tree (log)'

Several morphemes (including quotative markers /ɔ́ɔ́/ and /kàlaá/ and the connective /kàleé/ 'so', 'and') seem to have both non-sandhi and sandhi forms which involve no change of meaning but which are related to speed of utterance or to the occurrence of pause.

(c) Two short monosyllabic function morphemes, /kàl/ ~ /kál/ 'at' and /kùb/ ~ /kúb/ 'only', are and remain free phonological words and assimilate their toneme to that of the last syllable of the preceding word.

9.5 SCOPE OF OCCURRENCE OF EXTERNAL SANDHI

Our knowledge of the *Teléfól* language is not yet sufficient for us to be able to predict the occurrence of external sandhi with any degree of confidence. All that can be done is to indicate a few trends and suggest some lines of further enquiry.

(a) Within a given class, do certain words undergo sandhi changes while others have no sandhi forms? Is such a distinction based on phonological factors or upon morphological sub-classes? So far as tone is concerned, it is pertinent to note that of the one-toneme words investigated,

all those with DOWN in isolation have sandhi forms, and all those with UP in isolation have no sandhi forms.

(b) Most of the words involved in sandhi changes have an isolation form as well as one or more sandhi forms, and this isolation form quite often occurs in connected speech. What are the syntactic and/or phonological conditions under which sandhi regularly occurs? The contrastive examples listed in **9.4**(b) underline the importance of answering this question. It does appear that sandhi mostly occurs within syntactic phrases rather than between such phrases, for instance. Is sandhi ever optional, or ever related to speed of utterance?

10. ALTERNATIVE TONAL ANALYSIS

In sections **7** and **8** no attempt was made to state the allophonic composition of the two tonemes, UP and DOWN, nor that of final intoneme, since any such statements would be too lengthy and involved to give a simple picture of these tonemes. Instead, the pitch realizations of toneme sequences up to four were presented in Tables I-V. By following these tables it is possible to construct by analogy the pitch contours to be expected for words of five or more tonemes.

10.1 NATURE OF UP AND DOWN ANALYSIS

A careful examination of Tables I-V reveals several of the features of the two tonemes postulated for *Teléfól*:

(a) In all but utterance-final syllables, the essential nature of the UP and DOWN tonemes is neither pitch registers nor pitch contours (the two polar types postulated by Pike), but is rather a pitch step up or down to the next syllable.[11] In an utterance-final syllable UP is realized as a level or rising pitch and DOWN as a falling pitch. The fact that the phonetic evidence for a given toneme is to be found in the phonetic nature of the following toneme is not as strange as it might seem at first. It is commonly acknowledged in acoustic phonetics that voiceless stops, for instance, are recognized by the transition phenomena in contiguous vowels.[12]

(b) The first, sometimes the second, and the last tonemes of a word are considerably affected in their phonetic details by the tonal nature of the preceding and following words, and especially by a preceding or following final intoneme. One consequence of this is that the UP and DOWN tonemes have almost the same allophones, but with different distributions. These two tonemes do not actually overlap

(in the classical sense) because in each context they have allophones which are contrastive. Every pitch contour can be uniquely equated to a sequence of these tonemes.

(c) Elaborating further on (b), the phonetic pitch of the first (and sometimes the second) toneme of a word is affected by the final toneme of the preceding word. This is not sandhi but allophonic conditioning by the preceding toneme. This conditioning of allotones across an external juncture is similar to but less extensive than the conditioning that pertains between tonemes within a word. Whereas this feature is true of the contours presented in Tables I and II, those presented in Table V show no such conditioning across an internal juncture. This apparent inconsistency needs more investigation. For our present purposes it is assumed that the conditioning seen in Tables I and II is the norm and that the lack of conditioning seen in Table V is a rarer variant phenomenon (in either the informant or the investigator) that appeared under the circumstances of focussing attention on internal junctures.

10.2 ALTERNATIVE PITCH REGISTER ANALYSIS

It is possible to analyse the pitch data included in Tables I-IV in terms of two register tonemes, HIGH /ˊ/ and LOW /ˋ/. Under this analysis each word, in its basic form, has the same number of tonemes as it would under the UP and DOWN analysis, but the first vowel is toneless, and after the last syllable there is an extra floating toneme. For a given word, each UP is changed to a HIGH and each DOWN is changed to a LOW, and each new toneme is moved one place to the right. Thus CV́CV̀CV́C under the pitch step analysis becomes CVCV́CV̀C ˊ under the pitch register analysis. The floating toneme at the end of the word attaches itself to the toneless first vowel of the next word. This corresponds to the across-juncture conditioning described in **10.1**(c). It is the chief characteristic of the final intoneme that it causes the floating toneme to attach itself to the final syllable of the word to which it belongs morphologically, rather than to the first vowel of the following word, thus accounting for the pitch glides so common on utterance-final syllables. When preceded by a final intoneme, the toneless first vowel of a word has no available floating toneme to provide its pitch. In this situation, the pitch of the first vowel is determined by the first toneme immediately following the toneless vowel. It is mid pitch when followed by a LOW toneme and upper mid pitch when followed by a HIGH toneme. The toneless nature of the first vowel may be

historically related to the extreme shortness and quality neutralization observed in the first vowel. (See **2.2** and **6.2.**)

One way to test the descriptive efficiency of this pitch register analysis is to re-formulate the external sandhi rules of **9.4** in terms of HIGH and LOW. The result is virtually identical to that in **9.4** apart from the substitution of HIGH for UP and LOW for DOWN. Thus it seems that in their effect on the description of sandhi the pitch step and pitch register analyses are fully equivalent. Also, apart from being located one position to the right, the distribution of HIGH and LOW is similar to that of UP and DOWN. In fact, there seems to be no difference between the two analyses on the grounds of simplicity. On the subjective grounds that the author considers step tonemes carried by each syllable of a morpheme or word more elegant than register tonemes which leave the basic form of a word with one toneless syllable and one floating toneme, the former analysis has been preferred in the present paper. Of course, both analyses are rather unusual, because the pitch phenomena they describe are somewhat atypical.

11. ORTHOGRAPHY

It is the author's belief that the matter of orthography is a legitimate part of linguistics, despite the educational, social, and political factors involved in it. Furthermore, though phonological analyses that bear little similarity to orthographies (such as the "prosodic" and "generative" types) are quite legitimate avenues of investigation, no linguist ought to consider his study of the phonology of an undocumented language complete until he has dealt with the matter of a practicable orthography for lay use.

11.1 CURRENT ORTHOGRAPHY

As mentioned in **4.2** Rev. G.J. McArthur of the Australian Baptist Missionary Society made a tentative phonemic analysis of *Teléfól* and established an orthography which has been used by the Mission to this day. The literature in this orthography consists of about 200 pages ($6\frac{1}{2}$ in. by 8 in.), duplicated in about 100 copies, consisting mainly of Bible stories and doctrinal material.

The chief features of this orthography are:

(a) It does not indicate vowel length or tone. (In a private communication Rev. McArthur mentions that he recognized the existence of tone and/or length contrasts in

the language but did not complete their analysis before leaving the Telefomin area.)

(b) Some of the specific instances of juncture discussed in section **8** are transcribed as separate words, but the majority are written as suffixes. A few are transcribed both ways.

(c) The transcription of voiceless, centralized, or missing vowels of initial syllables is the same in almost every instance to that employed in the present phonemic analysis.

(d) The digraphs **kw** and **ng** are used for /k^w/ and /ŋ/.

(e) As described in **4.2**, **g** is written for intervocalic /k/ and /kd/ and for /d/ following /ŋ/, and **k** is written for /kk/.

(f) As described in **4.3**, intervocalic **w** is written following /o/ and /u/, where the present analysis posits /b/.

11.2 RECOMMENDATIONS

It is recommended that the phoneme symbols used throughout this paper be used in the orthography for *Teléfól* with the following modifications:

(a) DOWN toneme be left unmarked except in contracted syllables, where (ˆ) and (ˇ) should tentatively be retained.

(b) Digraphs **kw** and **ng** should be used for /k^w/ and /ŋ/.

(c) Apostrophe should be tentatively used for internal juncture /#/.

(d) In final syllables /e/ and /o/ do not occur, but only /ee/ and /oo/. As there is no length contrast involved, and as these long vowels carry only one toneme in the final syllable, final-syllable /ee/ and /oo/ should be written **e** and **o** in the orthography. A summary of the occurrence of vowels in orthographic terms may be of value:

monosyllables	**a**	**i**	**u**	-	-	**aa**	**ii**	**uu**	**ee**	**oo**
initial syllables	**a**	**i**	**u**	**e**	**o**	**aa**	**ii**	**uu**	**ee**	**oo**
medial syllables	**a**	**i**	**u**	**e**	**o**	-	-	-	-	-
final syllables	**a**	**i**	**u**	**e**	**o**	**aa**	**ii**	**uu**	-	-

(e) External consonantal and vocalic sandhi should not be written since (i) it tends not to occur in speech as slow as that used by *Teléfólmiín* learning to read, and (ii) there seem to be enough regularities in its occurrence to expect that further study will reveal a good measure of predictability.

(f) External tonal sandhi, being contrastive, should be written. However, rather than using the phonemic transcription of **9.4** (compounding for monosyllables and tone change for longer words), it is recommended that words be written in their isolation tonal form and that a hyphen be written between words wherever unpredictable external tonal sandhi operates. Certain function words (e.g. /nòò/ ~ /nóò/) seem only to have sandhi forms and these probably need no hyphen.

11.3 EVIDENCE FROM LOAN WORDS

One of the goals in setting up an orthography is that, in its choice of phoneme symbols, the orthography should conform as much as possible to the usage of the national or trade language. One way of checking on this is to examine loan words to see the way in which vernacular speakers equate the phonologies of the national language and the vernacular. The only instance in which such a check seems necessary for *Teléfól* is in the matter of tone as compared with English unwritten accent.

English and Neo-Melanesian monosyllables of the pattern CVC are usually accepted into *Teléfól* in the otherwise rare form CV̀V̀C. For example, English **tin**, Neo-Melanesian **tin**, *Teléfól* /tíìn/ **tíin**. This tonal sequence corresponds to a pitch pattern that is falling, and is very similar to an Australian English citation intonation.

Of longer English words with accent on the first syllable that have entered *Teléfól* (usually via Neo-Melanesian), about two-thirds have one or two UP tonemes on the first syllable, and DOWN tonemes on succeeding syllables. For instance, Eng. **master**, Tel. /máàstà/ **máasta**; Eng. **pawpaw**, Tel. /fóófoò/ **fóófo**; Eng. **cabbage**, Tel. /kàábiìs/ **kaábiis**. Despite the fact that the actual tonal equivalents assigned to English accent in loan words are rather varied, by choosing to mark UP and not mark DOWN in the orthography we have the diacritic mark on the same syllable as the English accent in the majority of these words.

NOTES

1. The phonemes of *Teléfól* are: /b/, /d/, /f/, /k/, /k^w/, /l/, /m/, /n/, /ŋ/, /s/, /t/, /w/, /y/, /a/, /e/, /i/, /o/, /u/, UP toneme /´/, DOWN toneme /`/, final intoneme /./, and juncture.

2. For another language with two wide-range tonemes see: Eva Sivertsen, Pitch Problems in Kiowa, *International Journal of American Linguistics*, 22.117-130 (1956).

3. Two previous papers have given the language name as *Teleéfoól*. This reflects an earlier stage of the phonemic analysis which recognized more long vowels than does the present analysis. The two papers are: Alan Healey, Linguistic Aspects of Telefomin Kinship Terminology, *Anthropological Linguistics*, Vol. 4, No. 7, pp. 14-28 (Oct. 1962); Phyllis Healey, Teleefool Quotative Clauses, in: Papers in New Guinea Linguistics No. 1, *Linguistic Circle of Canberra Publications, Series A, Occasional Papers No. 3*, Canberra, 1964.

4. A brief sketch of verb morphology is appropriate here. (a) Each verb has at least two stems, one marked for punctiliar aspect and another for continuative aspect. These stems may differ in various ways, but usually it is possible to identify within them a verb root and an aspect suffix. Some verb stems also contain an obligatory object prefix. (b) Dependent versus independent and open versus closed are two separate but similar dichotomies tentatively applied to verb forms. These dichotomies correlate with syntactic features of multi-clause sentences and are not unlike the concept of subordinate clause versus main clause. All dependent verbs are open; all independent verbs have closed forms and some independent verbs also have open forms which differ from the corresponding closed forms by the tonemes on the last two syllables. (c) A dependent verb consists of a verb stem plus various suffixes of either of two types - homopersonal and heteropersonal - which predict that the subject of the next clause is either the same as or different from that of this verb. (d) Some independent verbs consist of a verb stem plus a single suffix, such as those denoting customary action, negative reply and unfulfilled obligation. However most independent verbs consist of a verb stem plus three orders of suffix, the first order indicating "tense", the optional second order indicating negative, and the third order indicating subject-person.

5. Usually, in citing meaningful forms, juncture phonemes which commence or terminate the form are not marked, and juncture phonemes within the citation are represented by a space (see examples in **9.4**). However, any juncture phoneme which does not correspond also to the boundary of a "grammatical word" is represented by #. Suffixes are cited with an initial hyphen to indicate the lack of juncture phoneme at that point.

6. The phonetic nature of final intoneme /./ may be defined in terns of its effect on the pitch of the final syllable of an utterance as shown in Tables I and II. No other intoneme has yet been identified with certainty.

7. Monosyllables share the characteristics of both initial and final syllables of longer words. Their initial and final consonants have the same possibilities (see **3.1**) and similar frequencies (see **3.3**) as for longer words. They have the same vowel possibilities (see **5.1**) and similar vowel and gemination frequencies (see **5.3** and **1.3**) as for final syllables. They have the same tonal possibilities (see **7.5**) as initial syllables.

8. Morris Swadesh, The Phonemic Interpretation of Long Consonants, *Language* 13.1-10 (1937); Kenneth L. Pike, Phonemics, Ann Arbor, University of Michigan Press, 1947, p. 138; Charles F. Hockett, Short and Long Syllable Nuclei, *International Journal of American Linguistics* 19.165-171 (1953).

9. The term juncture as used here refers to what is often called "open juncture", and lack of juncture corresponds to what is often called "close juncture".

10. This juncture stability is perhaps limited to morphemes of the major classes. For function words and affixes it may be better to say that the occurrence of juncture at their boundaries is a characteristic of the individual grammatically determined allomorph (e.g. Table VI).

11. Kenneth L. Pike, Tone Languages, Ann Arbor, University of Michigan Press, 1948, pp. 5-13.

12. For instance see: Charles F. Hockett, A Manual of Phonology, *Indiana University Publications in Anthropology and Linguistics*, Memoir 11 of *International Journal of American Linguistics*, 1955, p. 207.

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